JPRS 74731

7 December 1978

USSR Report

RESOURCES

No. 904

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50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. JPRS 74731	2.	3. Recipient's Accession No.
4. Title and Subtitle USSR REPORT: RESOURCES, No. 904			5. Report Date 7 December 1979 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address As above			13. Type of Report & Period Covered 14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

This serial report contains information on energy, fuels and related equipment; fishing industry and marine resources; water resources, timber, and electric power and power equipment.

17. Document Analysis a. Descriptors

USSR
Natural Resources
Electric Power
Energy
Energy Conservation
Fisheries
Fuels
Timber
Forestry
Water Supply
Economics

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group 2C, 2F, 5C, 10, 21D

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Unlimited Availability Sold by NTIS Springfield, Virginia 22161	UNCLASSIFIED	68
	20. Security Class (This Page) UNCLASSIFIED	22. Price

(See ANSI-Z39.18)

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

JPRS 74731

7 December 1979

USSR REPORT

RESOURCES

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ELECTRIC POWER AND POWER EQUIPMENT

UDC 621.311:331.875.1.002.237

FIFTIETH ANNIVERSARY OF THE FIRST FIVE-YEAR PLAN

Moscow ELEKTRICHESKIYE STANTSII in Russian No 8, Aug 79 pp 2-7

[Article by A. M. Nekrasov and V. Yu. Steklov]

[Text] A half-century has elapsed since the 16th Conference of the All-Union Communist Party approved (late April 1929) and the 5th All-Union Congress of Soviets (May 1929) confirmed the first five-year plan for development of the USSR national economy. This historic date marks solemnly the planned beginning of development of the socialist economy, the strength and advantage of the soviet structure and the fundamentally new forms and methods for control of the national economy generated by them. Precisely by making use of all of these advantages the soviet people, under the direction of the Communist Party, rose along the path of the five-year plans to well-developed socialism.

It was the great Lenin who was the moving force in creation of a planned economy. Guided by the points of view of scientific materialism and developing the teaching of K. Marks and F. Engel's, he formulated the fundamental principles on the paths of development of the productive forces of the proletarian state on the basis of a national unified plan of economic construction of a classless society.

Even before the victory of the Great October Revolution V. I. Lenin indicated the necessity, after victory of the proletarian revolution, for organizing the planning of the economic life of the country. On 1 October 1917, in an article entitled "Will the Bolsheviks Hold the State Authority?," he wrote: "The proletariat will act as follows when it wins its victory: it will put economists, engineers, agronomists and others under the control of workers' organizations for drawing up a 'plan,' for checking it, for seeking means for the economizing of work by centralization, for investigating measures and methods for the simplest, cheapest, most convenient and most universal control." [Lenin, V. I., POLN. SOBR. SOCH. (Complete Collected Works), Vol 34, p 320.]

After the victory of the October Revolution V. I. Lenin and the Communist Party developed their work for drawing up a unified national plan.

Only six months after the armed revolt, in April 1918, in his NABROSOK PLANA NAUCHNO-TEKHNICHESKIKH RABOT (Draft of a Plan for Scientific-Technical Work), V. I. Lenin proposed that the Supreme Council of the National Economy give authority to the Academy of Sciences for "forming a number of commissions of specialists for the most rapid possible drawing up of a plan for the reorganization of industry and the economic uplifting of Russia." [Lenin, V. I., POLN. SOBR. SOCH., Vol 36, p 228.] Already in this document V. I. Lenin directed particular attention to the electrification of industry, transportation and the use of electricity in agriculture. In particular, he emphasized the need for developing the energy base of the country on the basis of use of local, "non-first-class types of fuel (peat, coal of poorer grades) for obtaining electric power with minimum expenditures on the production and transport of fuel."

The significance of this historic document is exceptionally great. Here in dialectic unity there was formulation of the problems involved in creating a unified scientific national plan and ideas for electrification of the country were advanced. Such unity determined the Leninist thought that the first long-range plan should be an electrification plan.

In December 1920 the 8th All-Russian Congress of Soviets approved the plan for GOELRO (State Commission for the Electrification of Russia), named by V. I. Lenin in a report at the congress on the second program of the Party, supplementing its political program with a program of economic construction, with a work plan for reconstructing the entire national economy and bringing it up to the modern level of technology. "Without an electrification plan," emphasized V. I. Lenin, "we cannot proceed to real construction."[1]

The historic permanent importance of Lenin's GOELRO plan is that it was history's first single plan for renewing and reconstruction of all branches of the national economy. This plan determined the paths of economic and social restructuring of the country and provided for the creation of advanced productive forces in the proletarian state which could serve as a basis for new production relationships created by the victory of the October Revolution.

The GOELRO plan laid the beginning for socialist long-range planning. It created the basis for developing long-range plans and economic regionalization.

In a decree of the Central Committee CPSU, entitled "On the Fiftieth Anniversary of the First Five-Year Plan for Development of the USSR National Economy," it was stated: "A planned system is the child of socialism, an expression of its fundamental advantages. Its principles were determined by the great V. I. Lenin, under whose direction the world's first long-range national economic plan -- the GOELRO plan -- was developed." [PRAVDA (Truth), 18 March 1979.]

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[1] Lenin, V. I., POLN. SOBR. SOCH., Vol 42, p 157.

The Soviet people, under the direction of the Communist Party, carried out heroic work for implementing Lenin's GOELRO plan. Under the very severe conditions of post-war collapse and the economic blockade there was construction of the "pioneers" of socialist electrification called for in the GOELRO plan -- the Shaturskaya, Kashirskaya, Kizelovskaya and Gor'kovskaya GRES (State Regional Electric Power Plant), Volkhovskaya GES (Hydroelectric Power Plant) and others. Successful work was done on the construction of a number of electric power stations in the marginal regions of the country and in the national republics not included in the GOELRO plan.

The fuel industry, metallurgy and machine building grew. The production of a number of branches of industry approached the pre-war level and also partially surpassed it. The economic collapse was overcome. The total gross production of industry in 1928 exceeded the pre-war level by 32%. Petroleum production was 155% relative to 1913 and coal production was 122%. Steel smelting attained the prewar level. The gross production of machine building and metal working, to whose development the Communist Party devoted particular attention, increased in 1928 to 175% relative to 1913.

The most significant successes were attained in the development of electricity production. The installed power of electric stations in the country in 1927 attained 1,698,000 kW and the production of electric power was 4,205 million kWh, that is, the prewar level was exceeded by a factor of more than 2. Tens of new thermal and hydraulic electric power stations had already entered into operation. The construction of many new rayon electric power stations was developed. There was a considerable change in the structure of the power base of the country in which with each passing year an ever-greater role was played by rayon electric power stations which were large for that time.

It became clear that the reconstruction period in the economy of the country had ended and the basic intentions of the GOELRO plan would be carried out in the minimum of the planned time: in 10 years.

In December 1927 the 15th Congress of the All-Union Communist Party adopted a resolution on drawing up the first five-year plan for development of the national economy. It stated: "In the drawing up of a five-year plan for the national economy, as in the drawing up of any economic plan intended for a more or less prolonged time, it is necessary to strive for attainment of the most favorable combination of the following elements: broadened consumption by the masses of workers and peasants; broadened reproduction (accumulation) in state industry on the basis of broadened reproduction in the national economy in general; a more rapid, than in the capitalistic countries, rate of national economic development and an unconditional systematic increase in the relative importance of the socialist economic sector, which is the decisive and principal consideration in the entire economic policy of the proletariat." [KPSS V REZOLYUTSIYAKH I RESHENIYAKH S"YEZDOV, KONFERENTSIY I PLENUMOV TsK (The CPSU in Resolutions and Decisions of Congresses, Conferences and Plenary Sessions of the Central Committee), Moscow, Politizdat, Vol 4, p 33, 1970.]

In the resolution it was stated that "...particular attention must be devoted to the speediest possible implementation of the electrification plan...". [KPSS V REZOLYUTSIYAKH I RESHENIYAKH S"YEZDOV, KONFERENTSIY I PLENUMOV TsK, Moscow, Politizdat, Vol 4, p 38, 1970.]

The USSR Gosplan and all economic agencies of the country, with the participation of Party and soviet organizations, carried out an enormous amount of work on drawing up the first five-year plan for the USSR national economy.

The 16th Party Conference, held in April 1929, examined the draft of the five-year plan and adopted a resolution entitled "On the Five-Year Plan for Development of the National Economy," in which, proceeding on the basis of the general idea for industrialization of the country, strengthening its capabilities for defense and freeing the country from dependence relative to the capitalistic countries, it noted the accelerated rates of development of the economy, which should ensure an increase in the role of the USSR in the world economy.

The 5th All-Union Congress of Soviets in May 1929 confirmed the first five-year plan for development of the USSR national economy.

The backbone of the first five-year plan was the Leninist electrification of the entire country. In a report at the congress G. M. Krzhizhanovskiy stated: "...Vladimir Il'ich called the GOELRO plan the second program of the Party. We can say this even more rightfully concerning the five-year plan. Here there was still greater certainty because it was prepared taking into account the experience of construction of the economic principles of socialistic society."

"The coincidence of the five-year plan with respect to the principal decisive dates, with the GOELRO plan, which not without basis was called the Lenin plan, indicates that in the economic field we are proceeding in accordance with Lenin's guidelines." [Krzhizhanovskiy, G. M., IZBRANNOYE (Selected Works), Moscow, Gospolitizdat, p 266, 1957.]

But the scales of construction in the five-year plan considerably exceeded the scales called for by the GOELRO plan. For example, whereas the GOELRO plan proposed the start-up of 30 rayon electric power stations in 10-15 years, the First Five-Year Plan already called for the construction of 42 rayon electric power stations in five years.

The Soviet people, under the direction of the Communist Party, carried out heroic work for implementation of the program of the First Five-Year Plan. In response to the call of the 16th Party Conference, socialist competition was initiated and broadened for implementation of the five-year plan ahead of time. The slogan "The Five-Year Plan in Four Years," coined by the people, was enthusiastically adopted by broad masses of workers. As was noted in the decree of the Central Committee CPSU entitled "On the Fiftieth Anniversary of the First Five-Year Plan for Development of the USSR National

economy": "The First Five-Year Plan was a symbol of the revolutionary transformation of actuality, high rates of economic growth, scientific planning, the work exploits of the people. Its implementation ensured the creation of a solid material foundation for the construction of a socialist society." [PRAVDA, 18 March 1979.]

Particularly great successes were attained in the development of socialist industry. In 1932 the volume of industrial production had doubled in comparison with 1928 and the percentage of the means of production (group A) in 1932 was 53.4% versus 39.5% in 1928. During the years of the five-year plan such major enterprises as the Volgograd and Khar'kov Tractor Factories, the Gor'kiy Automobile Plant, the Kuznets and Magnitogorsk Metallurgical Plants, the First State Bearing Plant and others were put into operation. A total of about 1,500 enterprises were put into operation.

During the period 1928-1932 the development of the electric power industry in the country proceeded at rates outstripping the overall rates of growth of industrial production. The USSR electric power industry also considerably outstripped the rates of increase in the production of electric power in the largest industrially developed capitalistic countries. The production of electric power in the USSR during the First Five-Year Plan increased by a factor of 2.74. As a result, the relative role of the production of electric power in the USSR in the world energy balance increased to 4.9% in 1932 from 2.1% in 1929. The Soviet Union had already overtaken some capitalist countries with respect to the production of electric power.

During the years of the First Five-Year Plan the dynamics of growth of electric power production in the USSR is characterized by the following figures:

Year	Electric power production, billions kWh	Power of electric power stations, millions kW
1927	4.2	1.7
1928	5.0	1.9
1929	6.2	2.3
1930	8.4	2.9
1931	10.7	3.9
1932	13.5	4.7

A clear example of the change to new scales of development of electric power was the fact that only the increment in the production of electric power during the last year of the First Five-Year Plan (1932), being 2.8 billion kwhr, exceeded by a factor of 1.4 the total production of electric power in pre-war Russia.

The broad development of power production ensured an increase in the output from electric power stations to 4.7 million KW, that is, by a factor of almost 2.5 in five years. In 1931 the annual increment in new installed power

exceeded 1 million kW, increasing in comparison with the first year of the five-year plan (1928) by a factor of 5.

In the entire country the construction of new electric power stations developed. The most inspiring power construction project was the Dnepr hydroelectric power station.

Comrade L. I. Brezhnev, the General Secretary of the Central Committee CPSU, in his book entitled VOZROZHDENIYE (Regeneration), wrote: "The Dneproges is not simply one of the hundreds of electric power stations constructed during the years of Soviet rule. Today there are more powerful, more modern stations, but this one, on the Dnepr, for us became a sort of symbol of the industrial power of the Soviet Union." [Brezhnev, L. I., VOZROZHDENIYE (Regeneration), Moscow, Politizdat, p 4, 1978.]

In addition to the Dnepr GES imeni V. I. Lenin, the Dzoragetskaya and Yerevanskaya GES were started up in the Armenian SSR, the Kondopozhskaya GES on the Suna River in the Karelian ASSR, the Malaya Alamedinskaya GES in the Kirgiz SSR, the Abashinskaya GES in the Georgian SSR, the Khariuzovskaya GES in Kazakhstan and others. Work was completed on the first stage of the Zemo-Avchal'skaya GES on the Kura River.

During the years of the First Five-Year Plan construction began on a number of hydroelectric power stations over the entire territory of the country. These include the Rionskaya GES in Georgia, Kadyr'inskaya and Chirchikskaya GES in Uzbekistan, Nivskaya GES-2 in Murmanskaya Oblast, Ul'binskaya GES in Kazakhstan, Verkhne-Vorzobskaya GES in Tadzhikistan, and others.

Considerable successes were attained in the development of thermal electric power plants — the main base for supply of electricity to the national economy (Table 1).

Table 1

Index	1927	1928	1929	1930	1931	1932
Production of electric power at thermal stations, millions kWh	----	4.6	5.8	7.8	10.1	12.7
Fraction of total production, %	---	92	94	93	94	94
Power of thermal stations, millions kW	1.6	1.8	2.21	2.7	3.8	4.2
Fraction of total power, %	94	95	96	93	97	89

As can be seen from the cited data, the installed power of the thermal electric power plants increased by a factor of almost 2.44. Many of the 20 thermal electric power plants called for in the GOELRO plan were put into operation, including the Volgogradskaya (Tsaritsynskaya), Saratovskaya, Chelyabinskaya and Kuznetskaya GRES.

Some thermal electric power plants put into operation before the beginning of the First Five-Year Plan were radically reconstructed with a great increase in power. These included the Kashirskaya, Shaturskaya, Gor'kovskaya, Shterovskaya and Zuyevskaya GRES, the electric stations First MGES, "Krasnyy Oktyabr'," "Krasnaya Zvezda," and others.

A number of rayon electric power stations above and beyond those called for in the GOELRO plan were put into operation, such as the Dneprodzerzhinskaya, Bryanskaya, Shakhtinskaya, Novorossiyskaya GRES and many other thermal electric power stations.

Successively carrying out the principle of concentration of individual powers of electric power stations, Soviet power engineers during the years of the First Five-Year Plan brought the power of tens of thermal electric plants to 100,000 kW or above. The largest of these was the Kashirskaya GRES with a power of 186,000 kW. A number of thermal electric plants with a planned unit power up to 300,000 kW were constructed.

During the period of implementation of the five-year plan there was a process of technical re-outfitting of thermal electric power plants. Further successes were attained in mastering the economical combustion of various grades of local coals, anthracite rubble and peat. High-pressure boilers and increased productivity were installed at thermal electric power stations.

The first turbine with a power of 50,000 kW with steam parameters 35 kg/cm^2, 400°C, was first put into operation in 1931 at the Kashirskaya GRES. Thirteen steam turbines with a power greater than 25,000 kW were already in operation at thermal electric power plants by the end of the First Five-Year Plan.

The occurrence of technical progress in the production of thermal electric power ensured a decrease in the specific expenditures of conventional fuel at general-purpose electric power stations.

One of the most significant successes in the first five-year plan was the broad development of work on central heating. Whereas in the GOELRO plan the idea of a centralized supply of electricity and heat, produced together at central thermoelectric power plants, was only mentioned, in the years of the five-year plan it became one of the principal directions in the development of Soviet electric power. The first experiments with central heating, initiated in Leningrad in 1924, in 1928 were taken up by Moscow power specialists and soon spread extensively throughout the country.

A decisive role in the development of central heating was played by the June (1931) Plenary Session of the Central Committee of the All-Union Communist Party, indicating that "...the problem of expanded construction of powerful centralized thermal electric power stations, particularly in major industrial centers, both old...and new...must be fully taken into account in the further plan for electrification of the country." [KPSS V REZOLYUTSIYAKH I

RESHENIYAKH S"YEZDOV, KONFERENTSIY I PLENUMOV TsK (The CPSU in Resolutions and Decisions of Congresses, Conferences and Plenary Sessions of the Central Committee), Moscow, Politizdat, Vol 4, pp 551-552, 1970.]

Tens of thermal electric power stations were put into operation during 1928-1932, including in Moscow, Leningrad, Orekhovo-Zuyev, Vladimir, Kirovograd, Gor'kiy, Sverdlovsk and other cities. The construction of a number of new thermal electric power plants, the most important of which was the installation of the VTI high-pressure plant with the first single-pass boilers designed by Professor L. K. Ramzin, with steam parameters 140 kg/cm^2, 500°C, with a productivity 200 tons/hour, developed.

Work on the construction of high-voltage electric networks and the creation of rayon power systems developed during 1928-1932.

Electric power transmission lines (110 KV) were constructed in the Moskovskaya, Leningradskaya, Ural'skaya, Donetskaya, Dnepropetrovskaya, Gor'kovskaya and other power systems. In 1932 a line with a voltage of 154 KV was put into operation for transmitting electric power from the Dneprovskaya GES. The Svir'-Leningrad 220-KV high-voltage line was successfully constructed and put into operation in 1933, and also the Dnepr-Donbass 154-KV power line.

In 1932 the total length of the electric power network with a voltage above 35 KV was 8,438 km versus 1,465 km in 1928. The length of 110-KV lines increased from 76 km in 1928 to 4,111 km in 1932.

In 1930 the Lenin Komsomol took charge of electrification. It organized the All-Union Youth Movement for Acceleration of Power Construction, Mastery of New Equipment at Electric Power Stations and in Power Transmission Lines, Development of Soviet Construction of Power Plant Equipment and the Electric Power Industry.

The further development of the national economy of our country proceeded under the five-year plans, continuously being enriched by the experience of socialist planning and with the formulation of new tasks for the country to undertake in individual stages in the successive building of socialism.

Comrade L. I. Brezhnev, the General Secretary of the Central Committee of the CPSU, Chairman of the USSR Supreme Soviet, stated: "Each of our five-year plans is an important landmark in the history of the Motherland. Each of them in its own way is remarkable, bears the nonrepetitive characteristics of its time, and each of them will forever be impressed in the memory of the people. At the same time, they are inseparable from one another. These are remarkable chapters from one great book telling about the heroic work of our people in the name of socialism and communism."

The electrification of the country also developed progressively and its electric power base expanded. In each new five-year plan the scales of increase in USSR electric power production greatly exceeded the scales of the preceding five-year plan (Table 2).

Table 2

Показатель 1	1940 г.	1960 г.	1965 г.	1970 г.	1975 г.	1978 г.
2 Производство электроэнергии, млрд. кВт·ч	48,3	91,2	292,3	505,7	740	1038,6	1202,0
3 В том числе:							
4 ТЭС	43,2	78,5	261,4	425,2	612,8	872,4	987,8
5 АЭС	—	—	—	—	3,5	20,2	44,7
6 ГЭС	5,1	12,7	30,9	81,4	124,4	125,9	169,5
7 Мощность электростанций, млн. кВт	11,2	19,6	66,7	115,5	166,2	217,5	265,5
8 В том числе:							
4 ТЭС	9,6	18,4	51,9	92,8	133,8	272,1	197,6
5 АЭС	—	—	—	—	1,5	5,5	8,4
6 ГЭС	1,59	3,2	14,8	22,2	31,4	40,5	47,5

KEY:

1. Index
2. Electric power production, billions kWh
3. Including
4. Thermoelectric power plants
5. Atomic power stations
6. Hydroelectric power stations
7. Power of electric stations, millions kW

Table 3

Год 1	Мощность наиболее крупных электростанций, МВт 2	Максимальная мощность турбогенератора, МВт 3	Максимальная паропроизводительность котлоагрегатов, т/ч 4	Параметры пара п. а. турбиной 5	
				давление, кгс/см² 6	температура, °С 7
1917	57	10	30	12—15	350
1928	92	44	70		
1929	136				
1930		55		26	375
1931			192	29	430
1935	204	50	200		
1939		100			
1940	330				
1946	400			90	480
1953	1	1??	2?0	170	500/520
1956	610				
1958	750		420		
1959		150	500	130	565/565
1960	1020	200	640		
1963	1400	300	950	240	560/565
1966	2400				
1968		500, 800	2300		
1971		800			
1973	3000				
1974			1650	240	540/540*
1975			2650**	240	540/540
1978	3000	800	2650	240	540/540
1980 (план) 8	*	1200		240	540/540

KEY:

1. Year
2. Power of largest electric power stations, MW
3. Maximum power of turbogenerators
4. Maximum steam production of boilers, tons/hour
5. Steam parameters before turbine
6. Pressure kg/cm^2
7. Temperature, °C
8. Plan

[Footnotes to preceding table: * Temperature reduced due to conditions of reliability of metal; ** Single-shell boiler installation]

Table 4

Показатель 1	1975 г.	1980 г.*	1980 г. по сравнению с 1975 г., % 2
3 Общее производство электроэнергии, млрд. кВт·ч	1038	1320	127
4 В том числе:			
5 ТЭС	814	971	119
6 АЭС	20,2	72	355
7 ГЭС	126	185	147

KEY:

1. Index
2. 1980 in comparison with 1975, %
3. Total production of electric power, billions
4. Including
5. Thermal electric power stations
6. Atomic electric power stations
7. Hydroelectric power stations

Table 5

Показатель 1	1975 г.	1980 г.	1980 г. по сравнению с 1975 г., % 2
3 Вся установленная мощность, млн. кВт	217	270	124
4 В том числе:			
5 КЭС	103	120,5	116
6 ТЭЦ	60	74	123
7 ГЭС	40,2	52,0	129,3
8 АЭС	5,5	18,5	385
9 Нетурбинные электростанции	9,0	5,0	55,3

KEY:

1. Index
2. 1980 in comparison with 1975, %
3. Total installed power, millions kW
4. Including
5. Combined electric power stations
6. Thermal electric power plants
7. Hydroelectric power stations
8. Atomic power stations
9. Nonturbine electric power stations

The efforts of power specialists, builders of power equipment and builders of power plants over the course of all the five-year plants have led to the introduction of new progressive technical solutions directed to decreasing the specific consumption of fuel on the production of electric and thermal energy, consolidation of the unit powers of turbines and boilers and electric power stations, an increase in the parameters of steam, an increase in the voltage of electric transmission lines, the pressure heads of hydroelectric power stations, the use of maneuverable plants (gas-turbine and steam-gas installations) and the creation of combined power systems.

During a 50-year period (1928-1978) this made it possible to reduce the consumption of conventional fuel on the production of electric power from 820 to 331.1 g/[kWh], or by a factor of almost 2.5, increase the unit power of turbogenerators from 50 to 800 MW, thermal electric power plants -- from 100 to 3,600 MW, hydroelectric power plants -- from 560 MW (Dneprovskaya GES) to 6 million kW (Krasnoyarskaya GES). The voltage of electric transmission lines (a-c current) increased from 110 to 750 KV.

The combined production of thermal and electric power at centralized thermal electric plants has been greatly developed. The power of central heating plants increased from 12 to 250 MW and the production of heat increased from 2.1 million Gcal in 1932 to more than 1,000 million Gcal in 1978.

A Unified Power System for the country was created from individual power systems of rayon importance with parallely operating electric power stations each with a total power of 200-300 MW. By the end of 1978 it had an installed power in its electric power stations of 202 million kW, which ensures an electricity supply for consumers located in a territory greater than 10 million square kilometers with a population of about 220 million.

The dynamics of increase in the voltages of electric transmission lines looks as follows:

Year	Voltage, KV	Year	Voltage, KV
1913	35	1961	500
1914	70	1964	800*
1922	110	1967	750
1932	154	1977	1500**
1933	220	1978	1150**
1956	400		

*D-c current high-voltage lines

**The construction of a d-c current high-voltage line of 1500 KV and an a-c current high-voltage line of 1150 KV was begun

---

The Tenth Five-Year Plan was a highly important qualitative and quantitative stage in the development of Soviet electric power production. In the current five-year plan the principal directions in the development of electric power were determined in the resolutions of the 25th Congress CPSU. Less than 1 1/2 years remain before the completion of the Tenth Five-Year Plan and today it is already possible to evaluation of implementation of the program.

One of the principal directions in the development of electric power is improvement in the structure of the fuel-energy balance due to the broader use, together with petroleum and gas, of coal, shale, hydroelectric power and atomic energy, and improvement in fuel use. The transpiring shifts in the structure of the production of electric power (Table 4) show that in 1980 the consumption of organic fuel in the production of electric power will be reduced by more than 50 million tons of conventional fuel.

As can be seen from Table 4, in 1980 at hydroelectric power plants and atomic power stations there will be production of 257 billion kWh, or about 20% of the total production of electric power. There is also a systematic increase in the production of electric power from solid types of fuel (coal, shale, peat). At thermal electric power plants operating on such fuels the production of electric power will increase by a factor of 1.5 in comparison with 1975 and will exceed 900 billion kWh, whereas at thermal electric power stations burning gas and petroleum residue the production will increase only by a factor of 1.2 and will be 400 billion kWh. [Here and in the text which follows the data for 1980 are given according to preliminary estimates by the authors.]

Work has begun on the construction of very large fuel-energy complexes — Ekibastuzkiy in Kazakhstan and Kansko-Achinskiy in Krasnoyarskiy Kray.

In 1980 the installed power of all electric power stations should be about 270 million kW and in comparison with 1975 the structure of the installations will change due to an increase in the percentage of hydroelectric and atomic power stations which are being constructed in regions in the European part of the country (Table 5).

At the present time the number and unit powers of plants are changing due to an increase in the fraction of power units of 500 and 800 MW.

The development of centralized thermal electric power plants is occurring primarily due to the installation of central heating turbines with a power of 100-250 MW, whose number in 1980 will attain 230, whereas the installed power of all the central heating turbines will be about 74 million kW and their thermal power will be more than 240,000 Gcal/hour. In order to increase use of steam turbines water-heating boilers are being installed at thermoelectric power plants or in thermal networks, whose power by the end of the Tenth Five-Year Plan will be more than 80,000 Gcal/hour.

At atomic electric power stations during the Tenth Five-Year Plan it is necessary to put into operation more than 13 million kW of new capacity. This start-up will be a continuation of the program for the progressive development of atomic electric power, the realization of which was begun in the late 1960's. At the present time the installed power of operating atomic electric power plants is 8.4 million kW.

The first fast-neutron reactor with a power of 350 MW was put into operation in the Ninth Five-Year Plan. In 1979 plans called for the start-up of a still larger fast-breeder reactor with a power of 600 MW.

In the Tenth Five-Year Plan work was begun on the use of atomic fuel for the production of thermal energy. A technical-economic plan was formulated for the construction of an atomic thermal electric power station with two VVER-1000 reactors, each with two central heating turbines of 500 MW; the thermal power of such a thermoelectric power station will exceed 1,600 Gcal/hour. The basic principles were developed for the creation of two experimental-industrial atomic heat supply stations each with a power of 860 Gcal/hour; each such station will consist of two water-water reactors each with a thermal power of 500 MW.

At the end of 1980 the installed power of hydroelectric power stations will attain more than 50 million kW, or almost 19% of the total power of electric power stations and the production will be 185 billion kWh, of which about 40% of the electric power will be produced in the European USSR.

It should be noted that during the Ninth and Tenth Five-Year Plans the most rapid rate of development of hydroelectric power was in the Asiatic part of the USSR, where during these years the production of electric power doubled and will attain more than 110 billion kWh, whereas in the European and Ural regions the production of electric power will increase by only 25% (less than 80 million kWh).

Two hydroaccumulating hydroelectric power stations have now been designed and are under construction for load regulation: Zagorskaya -- with a power of 1,200 MW and Kayshyadorskaya -- with a power of 1,600 MW.

A peculiarity of development of electric power production is the ever-increasing centralization of the production of electric and thermal energy. The coefficient of production of electric power is approaching 98%, whereas in 1928 it was less than 40%.

The change in the consumption of electric power in the branches of the national economy during 1955-1980 is characterized by the data in Table 6.

More and more electric power is being expended on electrotechnical processes. For example, in 1978 industry expended on these processes about 240 billion kWh (electrolysis, electrothermics, electrochemistry, plasma processes, electric welding, etc.). More than 80 billion kWh were expended on

the electrification of railroad, urban and pipeline transportation during the past year there was an expenditure of more than 80 billion kwhr; on electric heating, electric preparation of food and electrical household equipment the expenditure was more than 35 billion kWh.

In 1980 the heat supply of the national economy will be almost 80% accomplished from centralized heat sources -- centralized electric heating plants, rayon and industrial boiler installations; the heat consumption will be 2,300 million Gcal per year. During the period 1975-1980 in heat supply, as in the supply of electricity, there is a quantitative and qualitative change in the production and distribution of thermal energy. The most rapid increase is in the production of heat for home heating and a hot water supply for the everyday communal-household supply of cities.

Table 6

	Отрасль народного хозяйства 1	Потребление электроэнергии, млрд. кВт·ч 2		
		1965 г.	1975 г.	1980 г.
3	Промышленность	119,3	547,5	703,2
4	Строительство		21,2	27,0
5	Транспорт	5,4	74,4	104,0
6	Сельское хозяйство (на производственные нужды)	24,4	53,5	86,0
7	Коммунально-бытовое хозяйство городов и сел		139,0	188,0
*8	Расход на производство и транспорт электроэнергии (потери в сетях и собственные нужды электростанций)	31,2	151,0	193,9
9	Экспорт электроэнергии	—	11,3	—

KEY:

1. Branch of national economy
2. Consumption of electric power, billions kwhr
3. Industry
4. Construction
5. Transportation
6. Agriculture (for productive needs)
7. Communal-household needs of city and countryside
8. Expenditures on production and transport of electric power (losses in networks and needs of electric power stations themselves)
9. Export of electric power

By the end of 1978 the country had about five million kilometers of electric transmission lines with a voltage of 0.4-750 KV.

During the Tenth Five-Year Plan new progressive technical solutions, already mentioned above, such as use of steam turbines with a power of 500, 800 and 1,200 MW, hydroturbines with a power up to 640 MW, construction of thermal electric power stations with powers of 4 and 6.2 million kW, atomic electric power stations with reactors with a power of 440-1,000 MW, introduction of the fast-neutron reactor, 750-KV electric power lines, etc. are coming into use on an industrial scale.

Construction is proceeding on a number of experimental-industrial installations, such as installations for the technological processing of shales with a productivity of two million tons per year and Kansko-Achinskiye coals with a capacity of 1.2 million tons of coal per year for the purpose of obtaining higher-quality fuel for transport in the future into the European part of the country. The first segment of an a-c power transmission line with a voltage of 1,150 KV is being constructed. Planning and design work is being carried out for creating an experimental-industrial MHD generator with a power of 500 MW. Scientific research and experimental-industrial work is developing on the use of renewable types of energy -- solar and geothermal energy for their use primarily for the purposes of domestic heating and a hot water supply. Work is being done on the use of heat of low-potential sources (waste water of industrial enterprises and electric power stations) by means of heat pumps, and also the use of the heat discharged by ventilation systems.

Considerable efforts are being directed to the development and introduction of new, less energy-consuming technological processes in industry, measures for more rational and economic use of fuel-energy resources and secondary energy resources, for the burning of domestic trash and thereby obtaining hot water for heating purposes.

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The Tenth Five-Year Plan is a new stage in the development of the Soviet electric power industry, strengthening in practice the planned strategy for reconstruction of the fuel and energy balance of the country. The history of the Soviet five-year plans, whose principles were already laid by the great Lenin in the GOELRO plan and for the first time developed in detail in the First Five-Year Plan for Development of the USSR National Economy, is crowned by the Tenth Five-Year Plan -- the five-year plan of mature socialism.

The Soviet people, in marking the 50th anniversary of adoption of the First Five-Year Plan, is struggling with confidence for the creation of a material-technical basis for a classless society, using all the advantages of a planned economy and multiplying the heroic experience accumulated by generations of fighters for the building of socialism and communism in our country.

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CSO: 1822

UDC 621.311.22:553.541:662.613.11.004.3

IMPROVEMENT OF ESTONIAN STATE REGIONAL ELECTRIC POWER STATION

Moscow ELEKTRICHESKIYE STANTSII in Russian No 8, Aug 79 pp 20-24

[Article by B. I. Makaturin, P. N. Dmitriyev, M. Z. Gudkin and M. M. Brach, Giproproyekt - Estonian State Regional Electric Power Station]

[Text] Combustible shales are burned at the Estonian GRES (State Regional Electric Power Station) with a power of 1.6 million kW. The ash content of this local fuel attains 43%. Soviet experience has shown that the mineral part of the Estonian shales can be used effectively in the national economy as raw material for the production of construction materials, in road construction and in agriculture for increasing the alkalinity of acidic soils, etc.

Taking into account the value of the shale ash, the Leningrad Division of the Teploelektroproyekt Institute designed for the Estonian GRES a design of a unit for the collection and unloading of dry shale ash. The handling capacity of the ash-loading unit is two million tons of ash per year, which is 60% of the total quantity of the volatile ash. The design was developed taking into account the recommendations of the Giproproyekt Institute, which earlier had carried out initial adjustment and research work at the Pribaltiyskaya GRES, where combustible shales are also used as a fuel.

A scheme with pneumatic pressure transport was used for the collection and transport of dry shale ash. The design also provided for a system for hydraulic ash removal in the event of malfunctioning of the pneumatic transport and evacuation of all the remaining volatile ash and slag to the ash dump.

The electric power station has eight power units with TP-101 boilers. Two such boilers are installed in each power unit. For the purification of smoke gases each power unit is supplied with the following ash-trapping apparatuses: single-pass cyclones — 16; four-field electric filters of the PGDI-4-70 type — 4, in boilers Nos 1-4 each having 16 hoppers; four-field electric filters of the UG2-4-74 type -- 4, in boilers Nos 5-8 each having 8 hoppers.

The ash-loading unit has the following principal technological equipment: a compressor station of six compressors with a total capacity of 1,500 m^3/min of air under normal conditions; a silo warehouse (eight silos with a diameter of 12 m); pneumatic spiral pumps of the NPV63-4 type, of which 16 are reserve; blowers of the TV-80-1.8 type each with a capacity of 5,000 m^3/hour of air under normal conditions for feeding compressed air into the pressure locks and pressure lock switches; 160 pneumatic channels with a total length of about 3,000 m and a width from 125 to 250 mm; fans for the pneumatic channels -- 112 of the VVD-5 type with a head of 570 kg/m^2; 480 pressure locks; 208 pressure lock switches.

The layout of the ash-loading unit at the Estonian GRES is shown in the figure. In this scheme the ash is fed from the hoppers of the ash-trapping apparatus through pressure locks from the electric filters and forechambers and through the pressure lock switches from the cyclones through the pneumatic channels to the receiving hoppers of the pneumatic spiral pumps and then by these pumps the ash is fed through ash lines of a nonuniform diameter ("stepped" ash lines having the smallest diameter at the beginning of the transport line near the pneumatic spiral pump and then with an increasing diameter toward the end of the ash line) into two silo units each with a capacity of 3,200 m^3. Each unit consists of four such silos. The maximum reduced distance of transport of the shale ash is about 800 m with a rated internal diameter of the ash lines of 214 mm.

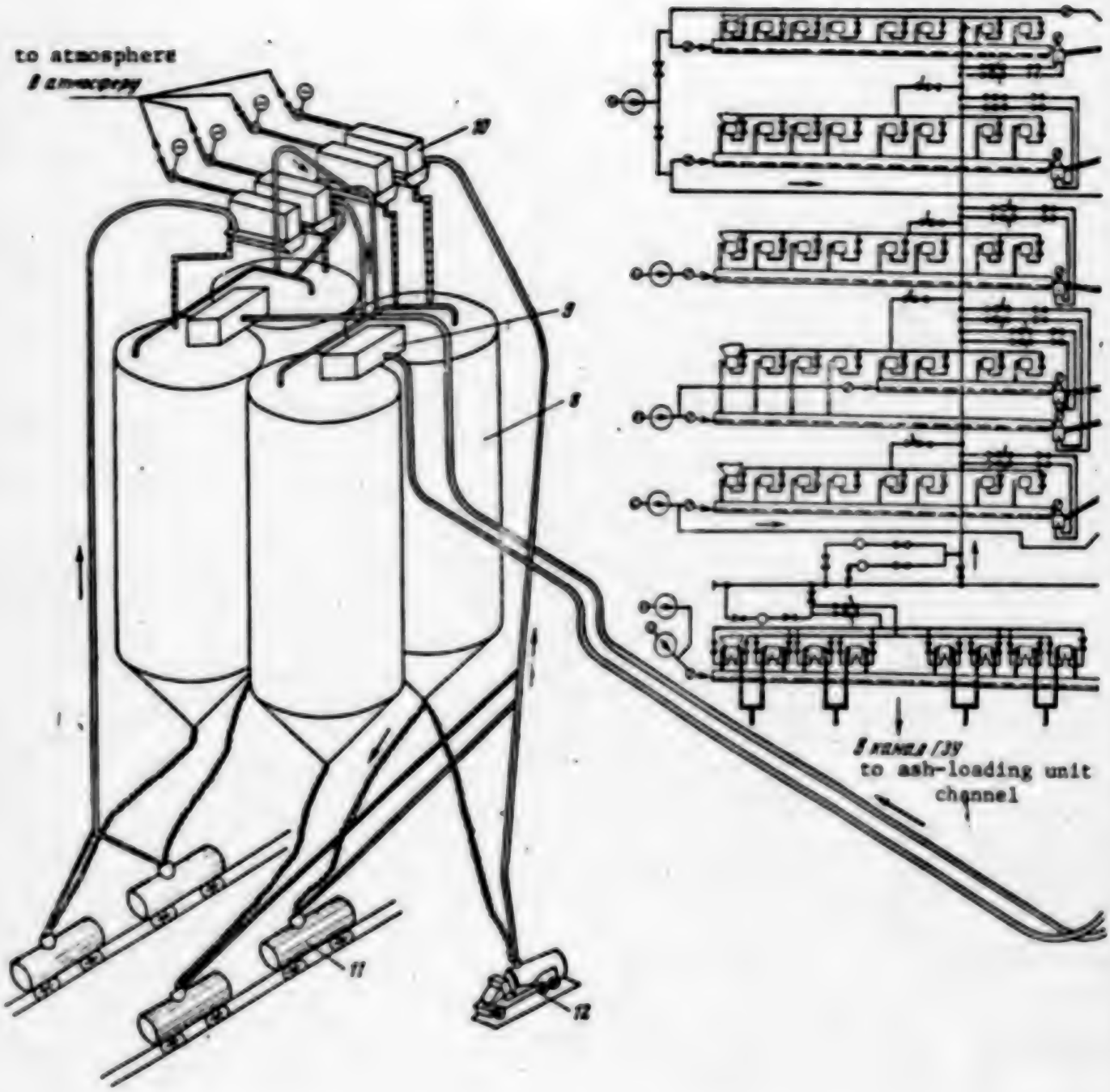
The design provided for the separate discharge of the shale ash from the electric filters and from the cyclones. Each power unit has four pneumatic spiral pumps, of which two (one reserve) are for the transporting of ash from the cyclones present at the zero reading and two (one reserve) for the transport of ash from the electric filters and forechambers installed at the reading -2.7 m. For each two pumps there is one ash line, that is, from the 32 pneumatic spiral pumps there are 16 ash lines laid out on the trestle, of which 8 are for cyclone ash. According to the design the entire yield of shale ash from one power unit is 75 tons/hour; the ash temperature is 160-180°C.

As indicated by investigations carried out by Giprotsement, the ash from the cyclones and the ash from the electric filters has different chemical and physicomechanical properties (see table). The principal physicomechanical properties of Portland cement are given as a comparison.

The indicated physicomechanical properties are important characteristics exerting an influence on the parameters of the pneumatic transport. For example, the density and granulometric (fractional) composition exert an influence on the required velocity and discharge of compressed air; the volumetric mass, angle of natural slope, angle and coefficient of internal friction exert an influence on the productivity of the apparatus; the angle and coefficient of friction against a metal surface, and also abrasiveness exert an influence on the wear of the transport lines.

Место отбора проб золы 1	Объемная масса, т/м³ 2			Плотность, т/м³ 10	Угол трения, ° 3		Коэффициент трения 4		Угол естественного откоса, ° 13	Содержание фракций, % 5								Эквивалентный средневзвешенный диаметр 6
	в рыхлом состоянии 7	на весах Пурка 8	в уплотненном состоянии 9		по золе 11	по стали 12	по золе 11	по стали 12		14								
15 Нагрузка энергоблока 185 МВт																		
Циклоны 18	1,195	1,490	1,455	2,85	35	30	0,667	0,554	30,0	5,15	4,83	13,82	6,12	6,84	33,44	27,44	2,36	87,9
Форкамеры 19	1,230	1,407	1,520	2,92	16	18	0,287	0,326	34,5	43,3	19,14	17,85	5,79	7,13	10,72	15,68	1,44	54,3
Электрофильтры 20																		
первое поле	0,983	1,035	1,298	3,29	25	24	0,466	0,446	27,2	35,71	27,30	14,51	10,72	4,90	5,06	1,64	0,96	23,2
второе поле	0,705	0,910	1,105	2,65	23	20	0,457	0,448	33,0	42,31	35,75	7,75	4,64	5,81	2,84	0,60	0,04	16,7
третье поле	0,758	0,856	1,007	3,13	27	23	0,510	0,425	58,0	60,02	22,22	1,58	6,78	7,55	1,55	0,28	0,80	17,0
четвертое поле	0,715	0,802	0,988	3,46	29	22	0,555	0,404	44,2	61,8	18,46	7,95	3,75	8,44	1,06	0,49	0,04	14,0
16 Нагрузка энергоблока 105 МВт																		
Циклоны 18	0,985	1,124	1,350	3,195	34	18	0,449	0,326	31,8	9,2	12,37	23,31	10,89	3,48	31,48	13,60	0,84	90,8
Электрофильтры (первое поле) 21	0,720	0,848	1,033	3,150	26	23	0,489	0,425	39,3	39,96	38,01	7,16	3,54	0,78	3,88	6,76	0,01	18,2
17 Портландцемент М-400																		
—	1,117	1,293	1,635	3,200	34	29	0,674	0,554	41,0	42,48	18,70	13,39	10,93	7,18	4,44	2,88	0,88	28,4

1. Place for sampling ash
2. Volumetric mass, tons/m^3
3. Friction angle, °
4. Friction coefficient
5. Content of fractions, %
6. Equivalent mean weighted diameter
7. In loose state
8. On Purka scales
9. In compacted state
10. Density, tons/m^3
11. Internal
12. Against smooth metal surface
13. Angle of natural slope, °
14. μm
15. Loading of power unit 185 MW
16. Loading of power unit 105 MW
17. Portland cement M-400
18. Cyclones
19. Forechambers
20. Electric filters: 1st, 2d, 3d, 4th fields
21. Electric filters (first field)


to atmosphere
to ash-loading unit
channel

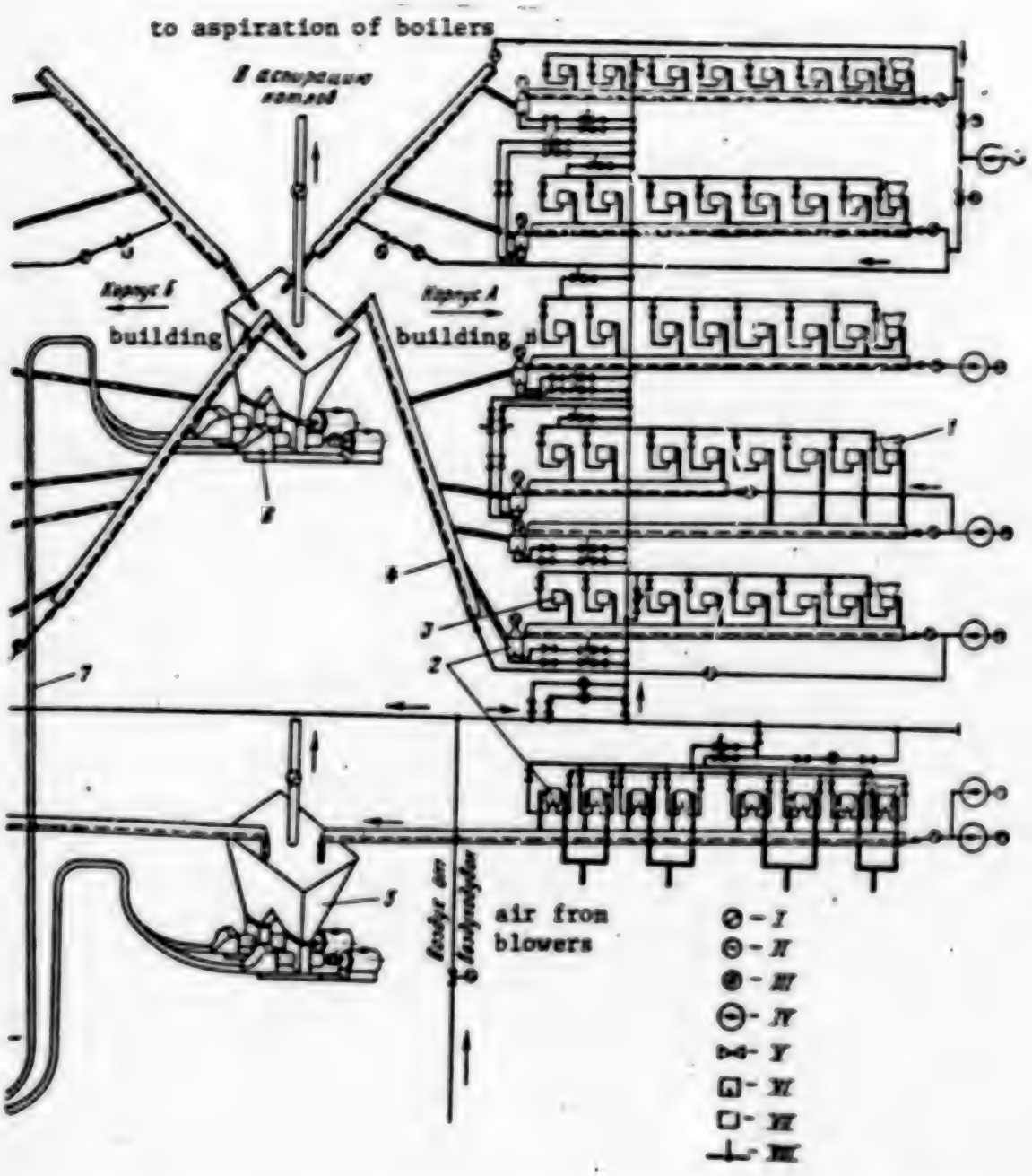


Diagram of ash-loading unit. 1) hopper for electric filters; 2) pneumatic pressure lock switches; 3) pneumatic pressure locks; 4) pneumatic channel; 5) receiving hopper of pneumatic spiral pumps; 6) pneumatic spiral pumps; 7) ash lines; 8) silo; 9) upper loading box; 10) SMTs-101 filter; 11) railroad tank car with pneumatic loading; 12) cement truck; I) rotating air gate; II) electric motor; III) water-oil separator; IV) fan; V) valve, gate, slide; VI) pneumatic pressure lock switches; VII) pneumatic pressure locks; VIII) connection of lines

Shale ash from the cyclones, as the coarsest material, requires higher transport velocities than ash from electric filters.

In the adjustment and operation process there were found to be the following important shortcomings of the design and the equipment of the ash-loading unit:

the pressure locks and the pressure lock switches in their design did not correspond to the requirements imposed for their operation, that is, there was no assurance that output could be regulated, there was a lamination of ash on the lateral walls of the lock, especially in the third and fourth fields of the electric filters where the ash is fine and the particles have an irregular geometric configuration. The gates between the hoppers and locks provided for in the design, which were in the form of metal pins, in the case of repair to the locks did not ensure a reliable closing, as a result of which the ash spilled downward at the time of repair of the pressure locks with replacement of the porous partition;

in the technological layout no provision was made for "dosing" devices between the hoppers of the electric filters and the pressure locks and therefore during the release of the ash after an accumulation regime and also at the time of shaking of the electric filters there was an overfilling of the ash-washing apparatus operating in the hydraulic ash-trapping system, after which the cleaning of these apparatuses was required;

the pneumatic channels with the design specifications recommended by the All-Union Heat Engineering Institute for the ash-loading unit at the Estonian GRES have a great capacity "reserve," which also had an influence on the nonuniform feeding of ash to the ash-washing apparatus;

the sets of SMTs-612 equipment for purifying the compressed air from moisture and oil, installed in the air lines from the blowers to the pressure locks, were extremely ineffective in operation; in addition, they had a great air resistance (about 0.25 kg/cm^2), which had a negative influence on operation of the pressure locks;

in the course of operation it was found that the ash lines for the cyclone ash are not capable of carrying the quantity of cyclonic shale ash which enters the receiving hoppers of the pneumatic spiral pumps during the time of blowing out of the boilers, as a result of which the ash lines became clogged;

the planned discharge of air (under normal conditions) of 75 m^3/min for the pneumatic transport of cyclone ash was too low, which exerted an unsatisfactory influence on the operation of the pneumatic spiral pumps;

as a result of the high velocities of the air passing through the jets into the mixing chamber of the pneumatic spiral pumps and the great abrasiveness of the shale ash there is a rapid erosional wear of the internal walls of

the mixing chamber. Since these chambers were constructed of cast iron, they cannot be restored after wear and in addition there is no guarantee of safe servicing of the mixing chambers.

The indicated shortcomings of the design and in operation of the equipment had a significant influence on operation of the ash-loading unit.

The adjustment and improvement of the system in the ash-loading unit at the Estonian GRES were carried out by the Giprotsement Institute jointly with the personnel at the electric power station.

In the system for the collection of shale ash in the pressure locks for the purpose of preventing the sticking of ash and its clogging of the discharge pipe there was an increase in the slope of the walls of the pressure locks with a simultaneous decrease in the cross section of the filtering surface; in the case of replacement of the filtering fabric and during the time of repairs, in place of the metal pins installed between the hoppers of the electric filters and the pressure locks in accordance with the design, the Estonian GRES developed and introduced a design of a pressure lock with a flat gate situated in the lower part of the discharge pipe; there was an increase in the pressure of the compressed air reaching the pressure locks from the blowers due to removal from the system of the SMTs-612 water and oil separators which had proven ineffective in operation. These measures ensured the reliable operation of the pressure locks and simplified their servicing.

For the better operation of the pneumatic channels, especially from the third and fourth fields of the electric filters, the slope of the pneumatic channels was increased from 6 to 8% and their width was decreased: in the forechambers -- from 125 to 50 mm, in the electric filters of the third and fourth fields -- from 150 to 50 mm, in the electric filters of the second fields -- from 125 to 100 mm, in the electric filters of the first fields -- from 150 mm to 50 mm; in addition to the two pneumatic channels provided for in the design only one pneumatic channel was installed and this operates satisfactorily with a yield of 10-12 tons/hour. The pneumatic channels from the cyclones were partially reconstructed. There was a decrease in the width of the pneumatic channels from 250 to 200 mm with a simultaneous decrease in the height of the upper box from 260 to 200 mm. A decrease in the width of the pneumatic channels from the cyclones made it possible to reduce the number of VVD-5 fans by two per power unit and to save metal.

In order to preclude the clogging of the ash lines there was a decrease in the diameters of the endless screws in the pneumatic spiral pumps from 220 to 180 mm for the pumps transporting cyclone ash and to 190 mm for pumps transporting ash from the electric filters, with simultaneous replacement of new sets of casings. The reconstruction of the pumps made possible a correspondence between the capacity of the pneumatic spiral pumps and the capacity of the ash lines, thereby attaining reliable pneumatic transport of the ash from both buildings of the boiler plant.

For the stable operation of the air discharge regulators [1, 2], mounted on the air lines in front of the pumps, and in order to reduce the velocity of the air escaping from the jets, arranged in two horizontal rows, into the mixing chamber, the 11 air jets were replaced by a single central nozzle with a large cross section.

A mixing chamber of steel construction in a welded version has now been developed and introduced in place of the factory-produced cast iron chamber. The measures taken for reconstructing the pneumatic spiral pumps considerably increased their efficiency. There was a reduction in the specific consumption of electric power required by the drive of the pneumatic spiral pump and on pneumatic transport of cyclone ash by 3.16 kwhr/ton, and on pneumatic transport of electric filter ash by 1.33 kwhr/ton. The introduction of the units for regulating the discharge of compressed air reduced the expenditure of compressed air (under normal conditions) on the pneumatic transport of electric filter ash by 27 m^3/ton.

The use of "stepped" ash lines makes it possible to have more economical pneumatic transport, particularly of the coarse cyclone ash, with a simultaneous increase in the useful life of the final segments of the ash lines. The use of "stone casting" on the ash lines at turns considerably increased the useful life of the latter.

The silo warehouse was also improved. The S-926 automated apparatuses were introduced for the loading of railroad cars and in these there was reconstruction of the loading equipment and "press" locks, making it possible to attain a highly productive loading process and an increase in operating reliability. In place of the aeration system from tubular elements, called for in the design, on all the silos there was installation of an aeration system designed by Giprotsement [3] and automatic units were introduced for distribution of the compressed air through the aeration boxes. As indicated by operating experience, the aeration systems are reliable and effective in operation and require a lesser quantity of compressed air. Monitoring level gages were installed on the silos and this made it possible to check the quantity of ash in the silos.

Experimental models of eddy apparatus designed by Giprotsement [4] were introduced for eliminating droplet moisture from the compressed air in the silo warehouse. These proved to be effective in operation, especially in the case of great expenditures of compressed air (under normal conditions) -- above 1,000 m^3/hour.

The work done on the adjustment and improvement of the ash-loading unit at the Estonian GRES made it possible to reduce the specific expenditure of electric power by 7 kwhr per ton of unloaded ash and in 1977 to introduce a unit for the planned capacity. As a result of introduction of the Giprotsement design changes, as well as adjustment of the systems and equipment of the ash-loading unit at the Estonian GRES, the resulting economic savings were more than 243,000 rubles annually.

Shale ash was released for agriculture at a price of 1.1 ruble/ton. The number of servicing personnel for the ash-loading unit is 76. The annual operational costs for the ash-loading unit were about 794,000 rubles.

Summary

The complex of introduced improvements ensured uninterrupted operation of the ash-loading unit, increased the reliability of its systems, and simplified the systems for the collection, transport and unloading of shale ash for users in ever-increasing quantities from the Estonian GRES.

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FIFTIETH ANNIVERSARY OF FIRST FIVE-YEAR PLAN NOTED

Moscow ENERGETIK in Russian No 8, Aug 79, pp 1-3

[Article by S. G. Mkhtaryan, Board Member, Head of the Main Economic Planning Administration of the USSR Power Ministry]

[Text] A half-century has elapsed since the time of adoption of the First Five-Year Plan for Development of the USSR National Economy. In a decree of the Central Committee CPSU, entitled "On the Fiftieth Anniversary of the First Five-Year Plan for Development of the USSR National Economy," there is clear exposition of the magnitude and importance of the socialist five-year plans, inseparably associated with the impressive results attained by the country in all fields of social development.

A planned system, the creation of socialism, is an expression of its radical advantages.

It is pointed out in the decree of the Central Committee CPSU that "Planning of the development of the national economy is one of the most important scientific and social achievements of the 20th century and revolutionary practice of transformation of social life. In planning V. I. Lenin saw the core of control of the national economy. He emphasized that "it is impossible to work without having a plan drawn up for a long period" and for serious success he emphasized the necessity for having a unified long-range economic plan on a national scale.

National long-range plans for the development of all branches of the socialist economy and culture first came into use in the USSR. Under the direction of V. I. Lenin there was formulation of the world's first long-range national economic plan -- the GOELRO plan (plan of the State Commission for the Electrification of Russia).

Progressively carrying out the five-year plans for development of the national economy, the Soviet people, under the direction of the Communist Party, ensured unprecedented rates of revolutionary transformation and growth of the power of our Motherland. A decisive force in implementation of the five-year plans was the people, rallied around the Communist Party.

The First Five-Year Plan — the pioneer of the Soviet five-year plans, raised the country to the peaks of economic and social progress.

"Each of our five-year plans is an important landmark in the history of the Motherland," stated Comrade L. I. Brezhnev. "Each of them in its own way was remarkable, having nonrepeatable characteristics for its time, and each will be forever impressed in the memory of the people. At the same time they are inseparable from one another. These are remarkable chapters of a single great book telling of the heroic work of our people in the name of socialism and communism."

The five-year plans are a powerful creative force inspiring the broad masses of the Soviet people to work feats.

The First Five-Year Plan for Development of the USSR National Economy was a plan for constructing the foundation for a socialist economy in the USSR. It was developed on the basis of the Directives of the 15th Party Congress (December 1927), adopted by the 16th Party Conference (April 1929) and confirmed by the 5th All-Union Congress of Soviets (May 1929).

In adopting the First Five-Year Plan, the Communist Party and the Soviet government, guided by the program for the construction of socialism in the USSR formulated by V. I. Lenin, used as a point of departure the objective laws of economic development, the maturing needs for development of the material life of society, the interests of the people.

The principal tasks of the First Five-Year Plan were:
-- switching the USSR from its backward technology of that time onto the rails of new, modern technology;
-- transformation of the USSR from an agrarian and weak country, dependent economically on the capitalist countries, into an industrial and powerful country;
-- final elimination of capitalist elements, broadening of the front of socialist forms of economy and creation of an economic base for eliminating classes for the building of a socialist society;
-- creation in the USSR of such an industry which would be capable of reoutfitting and reorganizing not only industry, but also transportation and agriculture on the basis of socialism;
-- switching small-scale and fragmented agriculture onto the rails of large collective farming, thereby ensuring the economic base of socialism in the countryside and thereby eliminating the possibility of restoration of capitalism in the USSR;
— creation of all the necessary prerequisites for the maximum uplifting of the defense capability of the country, making it possible to organize a decisive resistance to any attempts at military intervention from the outside.

An indispensable condition for solution of the main task of the First Five-Year Plan was the creation, in the shortest possible time, of heavy industry and its forced development.

The plan for the First Five-Year Plan called for an increase in the gross production of factory and plant industry by a factor of 2.6, including heavy industry by a factor of 3.1 and gross production of agriculture by a factor of 1.5. The plan called for a program of collectivization, whose implementation should increase the relative role of the socialist sector in the total sown area to 17.5% versus 2.7% in 1928 and in the commodity production of grain crops up to 43%.

The First Five-Year Plan was a grandiose plan for the outfitting of industry and agriculture in the USSR with the latest technology. The volume of capital investments increased by more than a factor of 4 (from 11.1 to 46.9 billion rubles). It was a militant program for an expanded socialist "attack."

Electrification of the national economy attained enormous successes. The power of all electric power plants increased from 1,905,000 kW in 1928 to 4,696,000 kW in 1932.

The five-year plan was carried out ahead of time, in 4 years and 3 months.

During the First Five-Year Plan there was solution of the highly important social problem, elimination of unemployment, the most evil enemy of the workers in the capitalist countries.

As a result of implementation of the First Five-Year Plan the foundation for a socialist economy was constructed in the USSR.

Our plans were and remain the principal tool in implementation of the economic policy of the CPSU. Their implementation ensures the strengthening and development of the socialist Motherland, the progressive buildup of productive forces, an improvement in the life of the people.

During a short period in history, during the ten five-year plans, there was an unrecognizable change in the country's economy. In 1978, over a period of five-six days, the social product was as great as in pre-Revolutionary Russia in an entire year. In comparison with 1928 the gross social product in 1978 had increased by a factor of 57, the produced national income had increased by a factor of 68, and the basic production capital for all branches of the national economy had increased by a factor of 34.

The successes of the national economy multiplied from one five-year plan to the next. The people grew and the army of power specialists is now well trained. Socialist competition was born together with the first five-year plan.

We remember the heroes of the first five-year plans and their work feats: Stakhanov, Busygin, Demchenko, Krivonos, Angelina, Vinogradovyye and the thousands who followed them.

From the sparks of socialist competition of the first five-year plans grew the flame of national competition. In the electric power industry there are now 500,000 Communist labor shock workers. Their number includes the front-

rank workers: Mashchenko -- the construction brigade leader of the Sayano-Shushenskaya GES, Fomenko — the brigade leader on Atommash construction, Ivchenko — the brigade leader on construction of the Chernobyl'skaya Atomic Power Plant and tens of thousands of their successors, front-rank workers and innovators.

Now the economic policy of the Party is embodied in the tasks of the Tenth Five-Year Plan, a five-year plan of efficiency and quality, with a specific program of actions in the field of economic construction and social development, determined by the 25th Congress of the CPSU. The Soviet people are devoting all their strength, knowledge and enthusiasm to its successful implementation.

During the three years of the Tenth Five-Year Plan the productivity of labor in industry increased by 11%, in agriculture by 23% and in construction by 9%. As a result of the increase in the productivity of social labor during 1976-1978 there was about a 4/5 increment in the national income. During these years the increase in the productivity of labor ensured a work economy of more than 11 million men; as a result of the decrease in the material required in the social product the saving of raw material, materials, fuel and other work products was about 8 billion rubles. At the present time the Soviet Union has an enormous national wealth, attaining more than two trillion rubles. And this despite the losses borne by the country in the Great Fatherland War, which constituted about 30% of the national wealth. A highly important part of the national wealth — the fixed capital -- by the end of 1978 attained 1,540 billion rubles, including productive fixed capital of 1,006 billion rubles.

For the purpose of sustaining and multiplying the national wealth in our country the expenditures are increasing on measures for the preservation of nature and the effective use of natural resources. During 1976-1978 state capital investments for these purposes were 5,376 million rubles.

Due to the planned use of the advantages of the socialist economic system the USSR has attained rates of development of industrial production unprecedented in history. During the years of the five-year plans (1929-1978) it increased by a factor of 128. Now there is more industrial production in the country than was produced in the entire world in 1950. In 1978 in the USSR in one day the same quantity of electric power was produced which would have required 1 1/2 years in 1913; corresponding figures were: petroleum -- 56 days, steel -- 35 days, mineral fertilizers — 3 years.

During the last 10 years the volume of industrial production in the USSR doubled. At the same time Great Britain required 29 years for the doubling of industrial production, West Germany — 18 years, France — 17 years, United States -- 16 years.

The backbone of the economic policy of the CPSU is ensuring the stable balanced development of heavy industry — the foundation of the economy. In 1978 the production of the means of production in industry (group "A")

increased in comparison with 1928 by a factor of 272. In 1928 there was a production of a total of 5 billion kwhr of electric power, and in 1978 -- 1,202 billion kwhr. This is greater than its present production in West Germany, France and Japan taken together. We have come right up to the United States with respect to the consumption of electric power in industry, which in 1978 was 86% of the level in the United States.

The development of territorial-production complexes -- Zapadno-Sibirskiy, Bratskiy, Pavlodar-Ekibastuzskiy, Orenburgskiy, Nizhnekamskiy and others -- is taking place. During the three years of the Tenth Five-Year Plan they ensured the entire increment in petroleum output, almost the entire increment in gas production, a considerable part of the increment of production of electric power, output of iron ore and coal, production of trucks and tractors.

An historic result of the agrarian policy of the CPSU became the transformation of agriculture into large-scale mechanized production, a highly developed sector of the socialist economy. On the eve of the First Five-Year Plan in the country there were 24 million fragmented peasant holdings outfitted with primitive equipment. At the end of the third year of the Tenth Five-Year Plan the country had 26,700 kolkhoz and 20,500 sovkhoz enterprises. The gross production of agriculture in 1978 increased in comparison with 1928 by a factor of 3.4.

The progressive course of the Party, directed to the technical re-outfitting of agriculture, led to fundamental changes in the mechanical equipment used in the countryside. Late in 1928 agriculture had 27,000 tractors, 700 trucks and only two combines, whereas late in 1978 agriculture had 2,530,000 tractors, 1,563,000 trucks and 700,000 grain-harvesting combines.

In 1978 the input of fixed capital in the country had increased by a factor of 152 in comparison with 1928.

Housing construction attained an unprecedented scale in the USSR. In the First Five-Year Plan a total of 57 million m^2 of dwelling space were constructed; in the Tenth Five-Year Plan -- 550 million m^2.

The planned process of the building of socialism is based on the organic combining of the attainments of scientific and technical progress together with the advantages of an economic system based on public ownership of the means of production.

During the years of the five-year plans enormous successes were attained in the elimination of illiteracy, ensuring universal primary education, creation of a well-developed network of general education schools and intermediate schools, workers' faculties, technical schools, colleges, scientific and cultural-educational institutes and libraries. The present-day flourishing of Soviet culture would be impossible without these accomplishments.

The principal result of scientific-technical progress was an increase in work productivity. During the years of the five-year plans the productivity of labor in industry increased by a factor of 23, in agriculture — by a factor of 5.9, and in construction — by a factor of 15.5.

The five-year plans led to a general uplifting and flourishing of the economy and entire culture of the union republics. According to the figurative expression of Comrade L. I. Brezhnev: "our five-year plans — these were the Leninist friendship of peoples, translated into the language of the economy."

The socialist economic integration of the member-countries of the Socialist Economic Bloc is also deepening and intensifying.

In response to the call of the Central Committee CPSU in connection with the fiftieth anniversary of adoption of the first five-year plan, a number of groups of power specialists and construction men in the power industry assumed additional socialist obligations:
— during the first half-year in 1979 to produce not less than 800 million kwhr of electric power above that called for in the plan, which will give a savings of 400,000 tons of organic fuel;
— in May 1979 to begin the construction, at Volgodonsk, of a complex of installations for the "Energomash" plant for the production of power equipment for electric power stations;
— in 1979 to develop the construction of high-power atomic electric power stations, which with attainment of their planned power will make it possible to reduce the consumption of organic fuel by 40 million tons annually, and also the construction of the first powerful electric power station of the Kansko-Achinskiy fuel-power complex of 6.4 million kW and the Boguchanskaya Hydroelectric Power Plant on the Angara with a power of 3 million kW.

On the basis of the accumulated enormous, unique experience of the five-year plans, bringing the USSR to a leading position in world scientific-technical progress and world culture, drafts of plans are now being drawn up for the Eleventh Five-Year Plan and a long-range plan up to 1990, deemed to become a major landmark on the path of creation of a communist society.

The implementation of our plans is being carried out in the name of strengthening and developing the socialist structure and a progressive growth of productive forces. They serve in attaining a higher goal in socialist social production: the most complete satisfaction of the material and spiritual needs of the people.

In a decree of the Central Committee of the Party it is emphasized with special force that now our country is at a high level of development — in the stage of mature socialism. It has a powerful economy, an enormous scientific-technical potential, politically mature highly skilled personnel, and accumulated rich experience in state construction. It has everything necessary for a further advance toward communism.

The order of the day is to realize the possibilities, completely and with the maximum effect, which are being afforded by a well-developed socialist society, its economic potential, everything which our national economy has at its disposal. But this depends on all of us, the Soviet people, on our organization, discipline, and smooth, unfettered work.

"The unanimous solid support of the political course of our Leninist Party by the people," noted Comrade L. I. Brezhnev, "is a reliable foundation for moving forward, an assurance that the proposed plans will be transformed into reality. They will be transformed into reality by the will of the Party, by the work of the Soviet people, and in the name of their well-being and happiness."

The Party and government, the Leninist Central Committee, and the Politburo headed by L. I. Brezhnev are devoting great attention to the development of the power base of the country. Our obligation is to give all our efforts, experience, knowledge and reasoning to the successful implementation of the program for the Tenth Five-Year Plan for the multiplication of the economic power of our socialist Motherland.

5303
CSO: 1822

COOPERATION IN CONSTRUCTION OF SAYANO-SHUSHENSKAYA POWER STATION

Moscow ENERGETIK in Russian No 8, Aug 79 pp 7-8

[Article by Candidate of Technical Sciences V. I. Bryzgalov, Director of the Sayano-Shushenskaya GES]

[Text] During recent years in the scientific and technical literature there has been a quite deep and thorough discussion of the problems relating to the efficiency of production as a result of a multisided approach to solution of different kinds of national economic problems on the basis of cooperation among scientific and production organizations.

In a conversation with bureau members of the Krasnoyarsk Kraykom CPSU on 1 April 1978 on the subject of the cooperation of Leningrad enterprises and organizations with the builders of the Sayano-Shushenskaya GES, L. I. Brezhnev stated: "The purpose of such cooperation was approved by the Central Committee because it leads to a shortening of the times needed for the construction of the required hydroelectric power stations. And in the commitments of both Leningrad and Krasnoyarsk there is mention of the high quality of work in the construction of this hydroelectric power station. Experience has convincingly demonstrated that specifically such an approach of associates to solution of highly important national economic problems gives the maximum effect."

The Sayanskiy Territorial Production Complex is being created in Krasnoyarskiy Kray. This is one of the largest in the country and includes electrotechnical, aluminum and railroad car plants. And the core of this complex, as it was stated figuratively at the 25th Congress CPSU, is the Sayano-Shushenskaya GES.

The Sayano-Shushenskiy Hydroelectric Complex was constructed for solving the multisided national economic problems involved in the production of electric power, river transportation, exploitation and preservation of the natural wealth of this region, agriculture, etc.

The hydroelectric power station is being constructed not far from Shushenskoye village -- the place of the Siberian exile of V. I. Lenin. It is opening a new stage in the "dream of Il'ich -- come true!" for the complete

electrification of Russia and should become a noteworthy historical monument expressing the greatest attainments of Soviet science and technology, construction, architecture and art.

The creation of such a structure is possible only with the joining together of the work forces of scientific, industrial and construction organizations. The materials of the scientific-technical conference "Effectiveness of Multisided Scientific Investigations for the Sayano-Shushenskaya GES" in 1977 expressed the essence of the cooperation of organizations for creating the Sayano-Shushenskaya GES as an "interbranch scientific-production combine functioning on Party-social principles." At the present time about 150 organizations in the country are participating in the cooperation, including 50 in Leningrad and more than 40 from Krasnoyarskiy Kray.

The involvement of organizations in the cooperation is creating among workers and engineers, scientists and designers, artists and layout specialists the spirit which is required, is affording a possibility to feel a personal responsibility for the great national undertaking and personal participation in constructing the hydroelectric power giant on the Yenisey. Such an approach will make it possible to overcome departmental limits and create a businesslike, creative and smooth functioning among organizations and specialists of different types. Particularly important is the smooth working of participants in the development of new models of equipment and apparatus, new research methods and directions in design.

Examples of the successful solution of the problems arising in the planning and construction of the Sayano-Shushenskaya GES are the developments, by cooperation of these organizations, of different types of high-voltage apparatus for the hydroelectric power station with the participation of the Leningrad Production Organization "Elektroapparat," the Scientific-Production Combine "Elektrokeramika," the D-C Current Scientific Research Institute, the Leningrad Polytechnic Institute imeni M. I. Kalinin, Lengidroproyekt, the Velikolukskiy High-Voltage Apparatus Plant and many others.

Under the conditions of narrow river canyons, quite restricted for the siting of the structures of the GES, and in particular, open distribution units, it is important that ways be found for reducing the areas used for placement of the ORU, for example, by means of a reduction of their size.

In order to reduce the size of the ORU-500 KV of the Sayano-Shushenskaya GES and lessening its estimated cost, on the proposal of the D-C Current Scientific Research Institute use has been made of nonlinear surge limiters with resistors based on zinc oxide. At the D-C Current Scientific Research Institute a study was made of the conditions for operation of the most rational schemes for cutting-in the 500-KV limiters and and the technical specifications for these were scientifically validated. Investigation made it possible to determine the rational distances for interphase gaps, which made it possible to reduce the size of the ORU-500 KV. New technical possibilities for a substantial improvement in the characteristics of protective equipment

were discovered as a result of the mastery at the "Elektrokeramika" Scientific-Production Combine of zinc-oxide resistors with a nonlinearity exceeding by an order of magnitude the nonlinearity of carborundum materials which are used in ordinary dischargers. The protective equipment with zinc-oxide resistors has been given the name "nonlinear surge limiters."

The creation of nonlinear surge limiters is a new direction in the construction of such apparatus, a qualitatively higher stage in the development of equipment for protection against surges. The nonlinear surge limiters differ advantageously from "valve" dischargers in the absence of successive spark gaps, simplicity in design, small size and a deep level of limitation of surges. According to the investigations of the "Elektrokeramika" Scientific-Production Combine the level of limitation of phase-phase commutation surges for the ORU-500 KV at the Sayano-Shushenskaya GES does not exceed 1.7 U_1. As a result of the high nonlinearity of the resistors the current in a normal operating regime does not exceed a few milliamperes.

The use of the new means for limiting surges in the ORU-500 KV at the Sayano-Shushenskaya GES made it possible to obtain an economic effect of about 1 million rubles. Today the surge limiters are undergoing experimental checking at the Vilyuyskaya and Zeyskaya GES, at substations in the Donbass and Leningrad.

Due to the extreme limitation on the area allocated to the ORU-500 KV, designers have also been assigned the task of developing a cut-out of considerably lesser size in comparison with VVB-500 cut-outs. The basic parameters of the cut-out at the same time must be 1.5-2 times greater. A so-called "macromodule arc-extinguishing unit" was created, making possible a considerable reduction in the number of arc-extinguishing chambers of the cut-off with a simultaneous increase in all its most important parameters. A super-high-speed air cut-off of the VVBK-500-50/3200U1 type has been created by the "Elektroapparat" Production Combine.

The principal specifications of the cut-off are: nominal current 3200 A, nominal cut-off current 50 KA, characteristic cut-off time 0.025 sec, nominal pressure of compressed air 40 kg/cm^2, pole mass 11,500 kg.

The principal advantages of air cut-offs of the VVBK type over VVB cut-offs are: a threefold increase in speed, an 8,000-kg decrease in pole mass, a decrease in pole size, simplified installation and regulation of the column for control of an element of the cut-off pole.

Many difficulties arose on the path of realization of the ideas advanced for the creation of the equipment necessary for the Sayano-Shushenskaya GES, especially if it is taken into account that all the main equipment and high-voltage apparatus of the Sayano-Shushenskaya GES — these are advanced models. However, the active overcoming of these difficulties became possible due to a unanimous understanding of the seriousness and importance of the problems, the common goal which was set in the medium of cooperation

of the organizations joined together for solution of the formulated problem.

Many problems must be solved, and in particular, the problems associated with preservation of the environment. For example, the creation of a reservoir leads to the cutting down of the forest, a change in the water regime and the heat balance of the river, entry of a considerable quantity of biomass into the water, etc. Intensive intervention in the environment, accompanied by the simultaneous action of various negative factors, complicates the prediction and creates a threat of appearance of inevitable changes in natural processes. At the same time, the extreme importance to the national economy of the complex under construction must not be compromised by the above-mentioned phenomena.

The Sayanskiy Hydroelectric Complex as part of the Sayano-Shushenskiy and counter-regulating Maynskiy hydraulic complexes will make it possible to supply the territorial-industrial complex with inexpensive electric power, reduce the level of high waters and the losses downstream associated with them, and also to create a waterway to the Tuva ASSR, the development of whose productive forces is being held back due to the lack of inexpensive transport routes.

The creation of a reservoir in a reach of the Yenisey not having importance for fishing will make it possible, with the putting of the Abakanskiy Fish Hatchery into operation, to organize the commercial catching of fish here. The cessation of ice going out in the spring with the formation of the reservoir and an open river channel in the lower reach will eliminate the annual losses from the ice going out. At the same time, the increase in winter water discharge in the lower reach, caused by operation of the hydroelectric power station, will create high waters and flooding which did not occur with a natural river regime in winter.

Thus, the optimum use of the hydroelectric power resources of the Sayano-Shushenskaya GES is possible only in the case of joint control with the Maynskiy Hydraulic Complex and taking into account the factors exerting an influence on other fields of national economic activity of the region. Up to the present time a solution of this problem in such a multicriterial formulation has not been dealt with for control of the regimes of hydroelectric power plants, although the time for this has long passed. Such a problem can be solved by creative cooperation of agencies, including branch scientific research institutes, colleges, power enterprises and other organizations concerned with problems relating to automatic control systems in the power field, and in particular, hydroelectric power. It would be particularly important to formulate a solution of the problem of complex optimization of all branches of water use applicable to the developing cascade of the Yenisey hydroelectric power stations and the GES on its tributaries. The great scale of this project can be handled only by the joint efforts of creative scientific and production organizations, for example, within the framework of such cooperation as the combine creating the Sayano-Shushenskaya GES.

An important achievement of the cooperation of organizations in the creation of the Sayano-Shushenskaya GES is also that in the process of planning the GES, designing of the equipment, development of units and apparatus the operating organizations can exert an influence on the quality of various projects, schemes and constructions for obtaining their best operational properties. Such a practice is widespread in the planning of the Sayano-Shushenskiy and Maynskiy hydraulic complexes.

Unfortunately, in an analysis of the effectiveness of hydroelectric power stations, as before, only cost considerations with respect to capital investments stand at the forefront and on a practical basis little consideration is given to factors exerting an influence on increasing the operational qualities of hydroelectric power stations. Without taking this into account in the planning of hydroelectric power stations it is impossible to ensure their operation in the future correctly and with the minimum expenditures because the operational qualities of the equipment and the electric power station as a whole are already created during the period of implementation of scientific research, planning-design and production-technological work at the scientific research institutes, in the laboratories and in plants, and also organizational-technical planning work carried out during the period of construction of the hydraulic complex.

In particular, at the Sayano-Shushenskaya GES, on the initiative of the operators and with their active participation, a decision was made that the generator hall would be constructed with a continuous roof, since the so-called "peninsular" layout complicates the transport scheme, restricts the conditions for repair and preventive maintenance work, creates a danger in carrying out such work, increases nonproductive expenditures of time, etc.

Planning decisions for the Maynskiy hydraulic complex are being made with the intention of fully automatic operational control of this complex from a single center -- the Sayano-Shushenskaya GES and repair-preventive maintenance servicing. Such problems, together with the problem of multisided organization of all branches of water use, were raised by the operators for solution by the planners of the hydroelectric power stations of the entire Yenisey cascade, and in particular, they raised the problem of the necessity for engineering-construction decisions to conform to the conditions for operation of the hydroelectric power stations (upon the completion of their construction) with the least expenditures of work and materials, that is, the conditions of efficiency of future operation of the GES as a whole. The solution of such problems is possible only with the cooperation of organizations.

The Sayano-Shushenskaya GES is already operating today. The start-up of its first unit on 19 December 1978 summarized the first stage in the construction and demonstrated that its start-up two years ahead of schedule is an enormous attainment in the cooperation of organizations.

5303/CSO: 1822

DELAYS EXPECTED IN COMPLETION OF THERMAL ELECTRIC POWER STATION

Moscow STROITEL'NAYA GAZETA in Russian 22 Aug 79 p 1

[Article by Correspondent Yu. Yudin]

[Text] The Krasnoyarsk TETs-2 (Thermal Electric Power Station-2) is the most important enterprise in the kray center to be started-up this year. The construction men had pledged to put its first power unit into operation on 30 September. The main general contractor, the Krasnoyarskgesstroy, the construction administration for the thermal electric power station, carried out the plan of contractual work for the first half-year. Nevertheless, there is doubt about the start-up of the unit.

For a month now tempers at the construction site have been heated up.

"The supplier has cut us off flat," grumbles N. Gur'yev, chief engineer of the construction administration. "There have been constant meetings: we cannot decide whether to continue the work or whether to undertake changes."

It appears that the shielded boiler pipes for the first unit, supplied by the Barnaul Boiler Plant, were fabricated from a type of steel not called for in the plan. This was discovered when they had already been installed and bricked.

The boiler plant admitted its responsibility, but partially:

"First of all, there were far fewer defective pipes than the builders say. And second of all, the supplier palmed this off on us," retorts chief engineer N. Samsonov.

A shortage of workers is felt at the construction site. But how to use the already available specialists? Recently the organization of work on the second shift was checked and it was found that the mechanisms at this time were only 30-50% used and the construction personnel frequently left their work places one or two hours earlier than they were supposed to.

And the force of socialist competition is not used properly. Judging from the papers, the "work competition" of the workers is flourishing here. But you begin to chat with people and you hear stereotyped answers: "I don't

know," "I haven't heard"... For a long time I tried to clarify how many groups were working under brigade contract. Different figures were mentioned: ten, six, five. Finally, N. Gur'yev clarified the matter: three. True, here he also qualified his statement: "Really -- not one!"

I won't hold back: both the construction men and the client clearly understand: the TETs-2 will not be started up on time -- it is difficult to get to the city in winter. This is also understood at the USSR Power Ministry. In a conference with the Deputy Minister F. Sapozhnikov a decision was adopted: prior to 11 June increase the number of construction workers by 600 persons. At that time the Glavteploenergomontazh promised to supply 1,430 tons of lacking equipment. The Glavenergoproyekt in turn promised complete delivery of the necessary fittings. Alas, only half of the 600 specialists arrived on the construction site.

And the Nazarovskiy assembly sector lost half of its workers to another project. Auxiliary boiler equipment and metal construction components did not arrive at all. Only 2,700 of the 4,300 fittings were delivered.

Thus, the force of the Minister's instructions was equal to virtually zero. Without question Comrade Sapozhnikov did not achieve their implementation. I got the feeling that in Krasnoyarsk they are in their hearts preparing themselves for a delay in the start-up of the TETs-2. This is evident looking at the work style of its director.

5303
CSO: 1822

ACHIEVEMENTS OF PAVLODAR-EKIBASTUZ COMPLEX ENUMERATED

Progress of Complex Noted

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 15 Aug 79 p 2

[Article: "The Dreamers Live on Earth"]

[Text] In the hot days of August we managed to visit all of the largest construction projects in the oblast, the enterprises in Ermak, Ekibastuz and Pavlodar, and we found out lots of new and, you might say, unique things. The most vivid impressions that remained were those from the meetings with the remarkable enthusiasts who live and work here, who through personal involvement augment the force and beauty of the territory. From meeting to meeting our conviction strengthened in the astonishing internal community of these people who do not resemble one another externally and who are busy with such diverse matters. This community can be seen in the common feelings of pride of participation in achieving Soviet reality and in the feelings of great personal responsibility for all that goes on around them.

And one more thing: dreamers live here. Dreamer-realists who not only think about a more beautiful future for the territory, but who also in the most selfless manner, working under what are at times infinitely complicated conditions, covered with salty sweat, draw close to the realization of their dream in their sleepless creative search.

Chosen solutions of both economic and technical natures are tested for correctness at the Pavlodar complex, which is called a national proving ground. And with good reason, too. The words "first" and "for the first time" are the ones most used here in ordinary conversation. No one knows, however, how hard it is at times to be first...

There is the Pavlodar aluminum plant, awarded the Order of the Red Banner and now noting this year its 15th anniversary. It is the pride not only of the republic's nonferrous metallur-

part played by his contribution in the fulfilment of this task.

Only two years and three months after the beginning of construction the tractor plant put out the first machine with the proud name "Kazakhstan." Then there was the hundred thousandth and then the two-hundred thousandth. In every one of these there is metal smelted at the hands of a remarkable master of his craft, the steel founder and Hero of Socialist Labor, V. N. Moshkina.

The installation of the No. 1 500,000-kW turbine is coming to an end at the Ekibastuz GRES-1, now under construction. There will be four in all at the station. It is, however, not only the first in regard to the installation sequence. It is first because there are as yet no other units of such capacity at any other thermal station in the Soviet Union. Much has been done by N. Moiseev's collective brigade, "Sibenergomontazh," in order to turn the turbine over to its users ahead of schedule. V. Moiseev is the initiator of competition among the power-plant builders who work under the motto, "The First 500-500 Shock Shifts."

The future is being conquered today. It is being done with the labor of many thousands of people. They are putting up unprecedented industrial projects in Pavlodar. They solve problems of architectural beauty and elementary public service organization. It is a case of that which is desired suddenly becoming reality. Along with all of this there is no triumphant fanfare. There is the persistent, creative search of the masses. There are problems which cannot be circumvented, which cannot be brushed aside.

Ekibastuz GRES-1 Begins Production

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 15 Aug 79 p 2

[Article by KAZAKHSTANSKAYA PRAVDA special correspondents G. Zhdanov and V. Stupak: "The ETEK. Once Again the ETEK"]

[Text] There is probably no need to characterize in detail the future GRES-1 and the coal strip mines, nor to provide technical and economic information about the fuel and power-production complex now under construction. Enough has been written about it already. Our goal is to dwell, if only briefly, on today's affairs at the complex and to tell what now excites the Ekibastuz personnel.

The builders of GRES-1 are planning in a few weeks to make an initial accounting of their four years of work. They will put

gical industry, but also that of the country as a whole. However, the road to universal recognition was far from simple for the aluminum workers. In order that everything should be understood, let us speak about the principal issue. World practice has not known examples of utilization of such low-grade materials as those processed here. In the majority of foreign countries the alumina is obtained from bauxite not less than half of which is aluminum oxide and not more than 5% is silicon oxide. Technically speaking, this is from raw material whose silicon coefficient reaches 15 to 20 parts. We have very little of such bauxite in the country. To make up for it, though, we have huge deposits of low-grade bauxite, such as Turgay ore. However, the State task faced the aluminum workers in all its magnitude: discover the feasibility of utilizing such ores and obtain high-grade alumina from them. The decision to build such a plant and to put it to work processing the Turgay deposits was essentially the beginning of our sector's nationwide experiment on a huge industrial scale. For the Pavlodar workers, a positive result from the experiment became a dream-task.

Excluding the special details, we will give a short statement. The new equipment has been obtained and is being employed successfully. The aluminum workers here are extracting up to 90% alumina from their raw material. This is significantly greater than the percentage extracted at other enterprises from high-grade bauxite, using the old technological scheme. The alumina comes out amazingly pure, up to 93-97% with a quality mark. The new method also provides a yearly savings of hundreds of millions of rubles throughout the country as a whole.

A group has been allowed to participate in the Lenin and USSR State Prize competetion for the development of new equipment for the extraction of alumina. This group is composed of engineers and, at present, plant workers and some people who have become either scientists or workers at State establishments. Among them are I. Prokopov, F. Alykov, E. Bespalov, A. Isaev, L. Ni, S. Berketov, Yu. Uzkikh and others. However, one may consider each of the many thousands of members of the plant collective which, through its labors, will bring the affair to an end, as a coauthor of this great scientific-industrial project.

What is this, then? An end to the dream? Not at all. Everyone here now knows how in the near future to make their plant into an enterprise of the completed technological cycle. The final product of their plant will be fine, silvery aluminum sheet. The dream continues to live.

Almost a half-century ago the dream was born. It was no one's dream at first, but later it was shared by a [illegible] whose name is uttered with great respect not only in Pavlodar. The young

agronomist Georgiy Grigor'evich Berestovskiy came to the territory in 1932. He had been driven to it his whole life long. He had become taken with his dream of protecting the land from the pernicious effects of erosion and of improving the land's fertility. Frankly speaking, a master's degree in agricultural science did not come easy for this man at first, nor did the title of Lenin Prize laureate later on. Everything happened. There was a pitched battle of scientific opinions in which the unenviable role of propagator of absurd ideas was given to one of the first men who initiated the introduction of tedious soil tilling and strip rotation of grain crops in the fields. There were endless cases of wounded pride, reprimands on the job, people working outside of their fields and, finally, the rudimental disarray of everyday life.

Progressive ideas and all that is healthy and necessary for the people and our society inevitably conquers. But how wholeheartedly you have to love your land, how courageously you have to believe in the correctness of the scientific and practical methods you have decided upon in order for you to endure everything and not break down before you are successful.

At present G. G. Berestovskiy is one of the organizers of, and deputy science director at, the Pavlodar experimental station for combating soil erosion. This station is a winner of the Red Banner of Labor. Berestovskiy himself is no longer young, but his dream of improving the land's fertility and of reaping huge harvests grows younger day by day. It may be that this is happening because he is always surrounded by young co-workers at the station, who are in the majority here and who believe firmly in the inevitable approach of their victorious scientific hour.

"Without this faith we can do nothing," affirms Oleg Aleksandrovich Shikhaleev, director of the station. "It is not for nothing that they say that bread is the master of all. And now, when a genuine industrial revoultion is going on all around us, it will be needed more and more. No, without faith in the new achievements in the fields we can do nothing..."

How many other stories can be told testifying to the selfless service of people in the affairs of society, how many famous names can be named!

For the first time in world practice equipment at the Ekibastuz pits was developed and introduced for the excavation of hard coal. The equipment makes broad use of rotating excavators with outputs of one to five thousand tons per hour. The rotary unit operator at the "Bogatyr'" pit, Hero of Socialist Labor A. I. Vitt, can maintain with good reason that there is no small

the 500-kV turbine into industrial use. Having started from scratch, the "Ekibastuzenergostroy" collective trust managed to obtain 165 million rubles in order that they might begin this May. Later on in June-July they went on a 9 million-ruble monthly construction and installation budget. At one time the builders of the Kazakhstan Magnitka had a dream of such scope, but they were never able to overcome this limit.

The pace that has been attained inspires confidence that the main task of the builders, to put the first and then the second of the station's power units into operation by the end of this year, will be fulfilled. In these days the most heated of times has entered the lives of the almost 9,000 members of the construction collective. The competetive tone is being provided by the installation workers of the "Sibenergomontazh" trust. Right here, at the turbine, works the brigade of V. Moiseev who was mentioned above. The fellows work in three shifts, fulfilling their assignments 130 to 140%. With an accelerating pace the people of the Ekibastuz section of the "Sredazenergomontazh" trust continue on the boiler assembly. On all of the construction site's enormous territory the work is in full swing, never letting up for a minute.

All of this does not mean, of course, that this business goes along without a hitch, without a snag. A visiting bureau of the Pavlodar obkom of the Kazakhstan Communist Party recently noted a number of shortcomings in the organization of projects and noticed also that they lagged behind the previously planned schedule. This is the true path to final success.

The ETEK, however, is not only electricity. It is also coal and the construction and reconstruction of the strip mines. It is natural to suppose that the mine builders act in synchronization with the power-plant builders because of temperament and desire: they are, you know, solving the same problem-the creation of an interlinked industrial complex. But right here there is a misfire.

In order to bring the strip mines at the Ekibastuz and Maykubensk deposits up to the level determined by the party and the government in the ETEK resolution, the builders need to obtain 1.7 billion rubles. That means that they need up to 60 million rubles per year. The "Ekibastuzshakhtostroy" combine has never reached that volume. Its ceiling has been 16 to 18 million rubles. In this respect the combine is the weakest economic link in the whole complex. The combine, created using the material resources of a trust that existed at one time, up to now in practice has been left with these very same material and technical resources. The new material base is being built poorly by the combine, and the annual plans in this sector are half-fulfilled. Why? A. M. Fridlyand, chief at the combine, answered to this:

"We do not have the people. We are short now by over 2,000 men. There is just no one to do the work."

Incidentally, E. E. Pilatov, manager of the "Ekibastuzenergostroy" trust, also alluded in the same way to a shortfall of workers when he explained the reason for the lag in some sectors of the GRES construction.

Here we have come to the most long-standing and touchy problem at the complex, which becomes more acute with each passing day. Even as the ETEK's foundation was being laid, the question of skilled workers was considered to be most difficult to solve. The question in not really just about one hundred or a thousand men, but about 2,000 builders, installers and power-production workers. How could they be attracted to such a little-known place as Ekibastuz was and had been for a long time? Gennadiy Alekseevich Nikoforov, first secretary of the Ekibastuz party gorkom, now says:

"Today the situation has fundamentally changed. The ETEK has announced itself loudly to the whole country. They are already coming here, already writing us. Not only "green" youths are coming here, but experienced people with families. They need living quarters, but they are few in number. Regretfully, we are forced to turn away those people we are short of..."

They have planned to build 140,000 square meters of living quarters in Ekibastuz during this year alone. The figure is inspiring all by itself. It exceeds last year's figure by more than twice. The realization of the program would noticeably help to alleviate the housing crunch. However, the leasing plans for the first half of the year have been frustrated: only 18,200 square meters have been put into use instead of 40,000. There are several reasons.

The main miscalculation of Minenergo and the republic consists of the fact that the housing construction in Ekibastuz had since the first day been oriented toward the construction of homes using improted materials. They are delivered here from Naberezhnye Chelny, Nizhniy Tagil, Bratsk and other cities no less distant. It is expensive, time-consuming and irregular. Having become convinced of the impracticality of this delivery system and moving toward the persistent requests of the Ekibastuztsy, the USSR Minenergo has finally adopted a decision to build at the ETEK a housing-construction combine with a capacity of 50,000 square meters of living space per year. It is assumed that the new enterprise will begin operating as early as next year. For it to be realized, however, the Ekibastuztsy

and the equipment suppliers must apply no little amount of effort. Until the combine is built, the most active assistance of the USSR Minenergo is needed in order that the construction-industry enterprises under its jurisdiction bear up to the delivery schedule for construction and parts for the Ekibastuz homes. You know, it is precisely poor delivery that was the primary cause in frustrating the semi-annual housing plan.

The social-cultural-domestic program of the "Ekibastuzshakhtostroy" combine is more modest than that of the power-plant builders', but it could make a significant contribution to solving the housing problem. However, they have taken an incomprehensible position at Minugleprom and, in particular, at its "Glavshakhtostroy". They have stubbornly not wished to decide the question of creating a housing-construction subunit as part of "Ekibastuzshakhtostroy" and, having found out about the power-plant builders' decision to build such a combine, they have to date kept it off the agenda altogether. They have taken their time, have they not? You know that sooner or later they will have to return to this issue. The coal workers will soon be needing housing. and large in scope, too.

We could continue this discussion which we have started. One thing is clear, however: the problem of housing is one of the main problems, no less improtant than insuring the successful industrial construction. There will be housing and there will be people. It means that all plans will be realized in time.

Development of Complex Continues

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 15 Aug 79 p 2

[Article: "Grow and Become Strong, Giant of Industry!"]

[Text] It is difficult to believe, but this is how it is: in only 20 years a powerful industrial bastion has appeared on the steppes. It is as if this territory of arid steppes, silvery lakes and enormous underground wealth had been accumulating its mighty power for centuries while waiting for its master. And it did wait for him-for Soviet man, the creator and builder, the champion and true master of the public trust. The period of the territory's active and rapid awakening began, it would seem, only recently-at the same time as the assimilation of virgin and disused lands. Already the Pavlodar Priirtysh'e is not only a developed agricultural area but also a large-scale center for electric power, coal mining, metallurgy, tractor manufacturing, petroleum refining and construction. It is enough to say that in the republics' division of labor the Pavlodar complex has results like these: ferrous alloys-60%, coal-54%, electric power-42% and much more that is necessary for the economics of production.

The formation of the Pavlodar-Ekibastuz Territorial Industrial Complex is the realization of the party's economic strategy in a period of socialism's development and a graphic example of how the 25th CPSU Congress has brought its historic decisions to life. The starting point in the count-down toward the next step in the growth of this region on the Irtysh was the resolution of the CPSU Central Committee and the USSR Council of Ministers adopted two years ago, "On the Creation of the Ekibastuz Fuel and Power-Production Complex and the Construction of a 1500-kV DC Transmission Line From Ekibastuz to the Center." In it they planned for the construction of new pit mines for coal and the reconstruction of older pit mines currently operating on the Ekibastuz and Maykubensk deposits with a goal of bringing the output to 170 million tons of fuel annually by 1990.

They also planned for the construction of four electric-power stations with a total output of 16 million kW. And this is only a part of the great construction plans which are already being carried out. The fuel and power-production complex, the ETEK, as it is called here, is the name applied to both the huge construction platform and the enterprises which are in operation. Of course, principal attention is focused on the ETEK. The Pavlodar-Ekibastuz Territorial Industrial Complex (TIC), however, is not only the ETEK. Many other interesting, large-scale problems are being solved in the economic sector.

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NUREK GES PUT INTO FULL OPERATION

Moscow IZVESTIYA in Russian 2 Oct 79 p 1

/Article by V. Surkov: "The Mighty Energy of the Vakhsh"/

/Text/ The TRUDOVOY NUREK, initiator of the All-Union Competition based on the "work-relay" principle, has noted a significant event: on the night of 1 October the ninth and last unit at the largest hydroelectric station in Central Asia was put into industrial operation.

The Nurek GES, with the highest dam in the world, was brought up to full design power -- 2.7 million kW. This event took place one year and three months ahead of the date planned at the 25th CPSU Congress.

The efficient working rhythm not only made it possible to save 15 months, but an important economic effect was attained as well. The building of a GES along with an irrigation development costs approximately one billion rubles. To date, however, the State had already received a billion and a half rubles from the Nurek by the time the last unit was engaged.

This was achieved owing to the utilization of the Nurek reservoir, which watered over a million hectares of new cotton fields. Here the Turkmen and Uzbek farmers for the seventh year in a row are reaping hundreds of thousands of tons of additional "white gold." In this time the Nurek has put out about 25 billion kWh of electric power.

"In this manner, all expenditures in the building of the station and the hydraulic development have long ago been repaid with interest," noted A. Malinov, first secretary of the Nurek party gorkom.

What will the new GES give to the economy? I asked V. Lyul'chak, the State commission chairman, to reply to this question.

"The prospects for its utilization are astonishing," said Vasiliy Iustinovich. "In the first place, it is the birth of new industrial centers in Central Asia, such as the Tadzhik aluminum plant, currently under construction and partially functioning. It ranks third

in the country in output. As is well known, the plant is already putting out the highest test-strength wing metal in the USSR. The Nurek's energy, sent along a LEP-500 power line, gave life to the plant. The construction of a second such line is now being completed along the route of the Guzar-Syrdar'ya GRES. The Nurek's industrial current arrives at new areas of sister-republic Uzbekistan. The Nurek will make it possible to continue mastering new cotton-growing regions on the Karshi steppes of Uzbekistan, in the Turkman Kara-Kum and on the Dangarinskoe Plateau of Tadzhikistan. The mastery of these regions will also occur before the set date. The Nurek's energy, cheapest in the USSR, will be transmitted into the central regions of the country during certain hours.

When we began construction on the Nurek GES, some foreign specialists contended that it was impossible in a region of force-nine earthquakes to erect a dam as high as a one-hundred storey skyscraper. However, life itself has refuted these "prognoses."

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CONSTRUCTION BEGINS ON PERM GRES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Sep 79 p 2

[Article by V. Ukolov: "Here Will Be a GRES!"]

[Excerpt] The lowlands on the banks of the Kama: swamps, thickets and undergrowth.... It was that way only recently, but now there is a broad area that has been cleared and drained on which the builders have gathered in order to solemnly lay the first concrete block in the foundation of the Perm thermal electric station, the construction at which was provided for at the 25th CPSU Congress.

They had come to the quiet rayon center of Dobryanok three years earlier. They began by concentrating forces and preparing the rear lines: a base of industrial construction, roads, communications, living quarters and children's and domestic institutions. Already they have obtained approximately 40 million rubles in capital investment. The cement-mixing operation is already working, along with the mechanized section, warehouses equipped with cranes and 88 out of 111 kilometers of varied piping. The new settlers received 630 apartments and expect 210 more by the end of the year. A concrete road leads up to the GRES, and a permanent railway runs some distance from the road. These garish changes on the land near Dobryanok immediately suggest that in the preparatory period the builders have managed to form a collective which is to use its powers to fulfill the party's primary assignment. They have created a strong backbone. Twenty-five hundred builders are laboring to produce high-quality, efficient work while striving to attain a goal within a shortened time period. The communists have lent a tone of socialist competition and are making maximum use of practical and economic factors.

The construction management collective at the Perm GRES is assured that it will obtain during the current year 14.5 million rubles of capital investment -- 500,000 over the plan.

"Modern methods of economy should correspond to the level and scale of the work begun today," said the minister of energetics and electrification of the USSR, P. Neporozhniy, at a meeting dedicated to the start of

the construction. He noted that the Perm station, with an output of 4.8 million kW, will become one of the largest in our country. Here they have planned for the highest efficiency and the most economical expenditure of fuel -- Kuznets coal. The minister called upon the collective to insure the delivery of electrical energy to industry in the Urals as early as 1982.

The flags flutter, the orchestra rings out. V. Novikov, the automated-crane operator, raises a concrete block. Under the first stone the builders customarily toss coins. A composite brigade of front-rank workers from industry takes the block and sets it in place.

B. Knoplev, first secretary of the Perm obkom of the CPSU congratulated the participants in the ceremony.

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KROTOV OUTLINES PROGRESS IN ELECTRIC POWER PRODUCTION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 30 Sep 79 p 2

[Article by V. Krotov, minister of USSR power-plant machinery construction: "High-Power Equipment"]

[Text] For the 14th time Soviet machine builders are today observing their professional holiday. Within our country in that time the industrial and scientific-technical potential has grown significantly, and thousands of large-scale enterprises equipped with the latest technology have been built. This is a result of putting into practice the consistent, scientifically-based, economic politics of the CPSU.

The contribution of the machine builders has been significant in raising the energy supply of our industry, and in the creation of more modern and more highly productive equipment for thermal, hydraulic and atomic electrostations.

Not only power-plant machinery production, which has been organized into a special branch, labors to convert energy resources into electrical energy by the most economical means. This great, intricate and complex problem is being solved by all sectors of machine construction in cooperation with the users. At the Kostroma GRES, for example, the expenditure of fuel per kWh for the commercial turbines with an individual output of 300 MW comprised 318.3 grams, as opposed to the designed expenditure of 327 grams. This is a serious achievement for the machine builders and the users.

The equipment built in the industrial associations at the A. A. Zhdanov plant in Izhorsk, the V. I. Lenin plant on the Neva, the K. E. Voroshilov turbo-motor plant, the "Red Boiler-Maker," and at other enterprises in the sector functions reliably in practically all areas of our broad economy. The Ust'-Ilimsk GES and TETs, the Pechora GRES, the Nurek and Sayano-Shushenskay GES's, the Novorozhenskaya, Rovenskaya, Leningrad and Beloyarskaya AES's, the Cherkassy industrial association "Azot," the Yuzhno-Yakutskiy coal complex, the Omsk plastics plant, 80% of the compressor stations on the country's gas lines, and also other industrial projects -- that is how far we are from a complete "geography" for the dispatch of our

sector's product. This list provides a rather clear idea about the scale of the economic ties within the ministry's enterprises and about how complex they are. The products that we send to our clients are often unique. Especially so when they are intended for projects in power production, large-scale chemical and other sectors. In order to create such technology and to satisfy the demands of each consumer, the machine builders apply the most modern technological equipment and special steels and alloys able to withstand the effects of high temperatures, speeds, pressures and aggressive environments.

The 25th CPSU Congress put an important State task before the power-plant machinery builders -- to develop the production of equipment for atomic energy, to raise the individual output of atomic reactors to a million kW and to insure the output of equipment for AES's that will raise power output at the AES's by 13-15 million kW.

Today we can report that the main problem in the development of a fuel-energy production complex for our country is successfully being solved. The production of steam turbines for AES's in the last three years of the current Five-Year Plan more than doubled in comparison with the corresponding period of the ninth Five-Year Plan. The enterprises of Minenergomash put out several high-speed turbines with an individual output of 500 MW for power units with 1,000 MW tubular-type reactors. The construction of slow-speed turbines of 1,000 MW capacity each is continuing. An earthquake-proof commercial installation has been built, the "VVER-1000," in which the number of gear drives in the control and protection systems has been reduced. This is a bold and original engineering solution which very significantly increases the technical-economic indicators of the reactor.

In our industry efficient equipment for prospective units at high-speed neutron AES's with tubular-type reactors of great individual capacity is being built, and development is now going on of high-speed million-kilowatt turbines specially intended for atomic energy production. Domestic machine construction for AES's is on the rise. Its future progress and development insures the creation of new power capacities in the industrial association at the A. A. Zhdanov plant at Izhorsk and at Atommash, where unique equipment is now being set up, construction of a second wing of the plant goes on, and a production worker collective has gathered and has begun construction of the first million-kilowatt reactor.

As practice has shown, units of 500 to 800-MW output are most efficient for a GRES. The equipment which will be produced at the Minenergomash enterprise in the 11th Five-Year Plan will also be basically in this range. I would like to note that the average individual output of steam turbines for power units which operate on fossil fuels has grown by a factor of 1.3 in comparison with 1975, while the maximum output has grown 1.5 times and has reached 1,200 MW. A power unit of such capacity is at present being built at the Kostroma GRES. The Soviet power-plant machinery construction

industry, having built the equipment for it, has taken over first place in worldwide construction of fossil-fuel powered steam turbines.

A remarkable feature of domestic hydroturbine construction was the drive toward the creation of prospective, highly reliable units that conformed to the hydraulic conditions under which they would have to transform water energy into electrical energy. At every stage in the development of Soviet hydroelectric-power production the stations had been equipped with the best hydraulic units created by the collectives of the reknowned industrial associations at the Leningrad metals plant, and the S. M. Kirov turbine plant in Kharkov, in conjunction with such famous enterprises of Minelektrotekhprom as the "Elektrosila", "Uralelektrotyazhmash" and other industrial associations.

The entire country now attentively follows the progress of work at one of the largest energy-production projects of this, the 10th and of the following Five-Year Plans -- the construction of the Sayano-Shushenskaya GES. Its creation is a national affair. More than a hundred scientific research and industrial collectives from the various ministries and departments are striving to accelerate this vast construction and to turn the plant over to the users by the target date. The Sayano-Shushenskaya GES, being the fruit of the labors of many machine builders, is remarkable for the unique equipment being delivered to it. The power-plant machinery builders have already sent to Karlov Stvor the third drive wheel for the 640 kW turbine which will develop 735 kW with a full head of water. Judging by the technical-economic indicators, this hydraulic unit is unique in worldwide power-plant machinery construction.

Not far from the capital, in the picturesque environs of Zagarsk, construction of still another unique station continues -- a water-storage station. The power-plant machinery builders are producing it for the so-called reverse turbines. During the period of greatest demand for energy this station will generate energy, but when there is a decrease in demand it will store water in its own reservoir, using the same turbines. Of course, many industrial and electrical-energy complexes are equipped by us in close cooperation with other machine-construction sectors. The interaction and interlinking of all our activities has acquired important significance precisely because we apply the programmed-ad hoc method to the solution of important economic problems. The further strengthening of ties between all sectors of machine construction and an increased responsibility for the complex solution to the large-scale tasks put before us have been provided for in the resolution of the CPSU Central Committee and the USSR Council of Ministers, "On the Improvement of Planning and the Strengthening of the Economic Machinery's Influence on Increasing the Efficiency of Production and the Quality of Work."

The 10th Five-Year Plan is close to completion. The drafting of target figures for the 11th Five-Year Plan is being concluded. Even greater tasks are being put before the machine builders. As early as the last Five-Year

Plan power-plant machinery builders planned to develop production of million-kilowatt high-speed turbines for AES's. We intend to complete the units at tubular-reactor AES's with turbines having an output that exceeds by a factor of one and a half the output of the turbines we are installing today.

The 11th Five-Year Plan is also a continuation of and a significant increase in the intensity of utilization of the Kansko-Achinskiy, Ekibastuzskiy and other coals for obtaining electrical energy and electrotechnological processing. Toward these goals it is assumed that twin units with 500-800 MW turbines and high-output boilers will be employed, as well as units of up to 1,200 MW.

The creation of a steam-gas unit with internally cycling gassification of solid fuel, such as the "PGU-1000," will be continued. This unit is envisioned as a combination of an 800-MW steam turbine and a 200-MW gas turbine.

Our industry has already in practice designed and built test models of the new, more efficient gas-pumping units of 16 and 25 MW output.... We hope that during the 11th Five-Year Plan we will successfully complete their industrial testing and begin commercial production. The boilmakers plan to assimilate the powerful units into industry and use them for the burning of cheap low-grade coal from the country's eastern regions and the burning of incidental gas from the Tyumenskoe deposit. They also plan to master small units having swirl combustion and fluidized beds.

For the present time and in perspective we obviously need to solve the problem of developing a fuel and energy-production complex for the country, not just by expanding the extraction of this or that type of fossil fuel, but first of all by charting the basic directions for improving the output of electrical power, as was stated in the party resolutions.

As far as concrete, long-range developments are concerned, we will continue the production of equipment for combined steam-gas units with internally cycled gasification of solid fuel, powerful fluidized-bed combustion chambers, small-scale boiler units and new types of complimentary equipment.

Along with the production of equipment for AES's, GES's and GRES's, the industry associations and enterprises plan at the same time to manufacture new types of various industrial power-production units which are better prepared for plant application. This is done in order to improve the level and quality of the installation. Along with this we are working to improve the standards of thermal units which supply industry, agriculture and command households with power. This will increase their efficiency. It is assumed that efficient, usable electric-power equipment will be created for the wider utilization of secondary energy resources and the electrotechnical processing of fuel.

Today, on Machine Builder's Day, I would like to say a few kind words about the selfless toilers -- the workers and the engineering staff who, through their innovation, persistence and skill, solve the intricate problems that have been put before the machine builders. Their high level of conscientiousness, organization, solidarity and diligence is the guarantee to all our success.

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ELECTRIC POWER SUPPLIES FOR 80'S OLYMPIC GAMES

Tallin SOVETSKAYA ESTONIYA in Russian 15 Sep 79 p 3

[Commentary by Albert Aleksandrovich Laks, deputy chief of the central industrial administration for capital construction, "Estonglavenergo:" "Electrical"Nourishment" for Regatta -- 80"]

[Text] Accommodating the participants, guests and spectators, providing them with food and transportation, organizing the trade network, special services facilities and the "spare-time industry" are not the only problems of the upcoming Olympic regatta. There is one more no less important than the rest -- the problem of supplying energy for the sailing center itself, as well as for the complex of projects related to the upcoming Olympics: the new telecenter, the multitude of communications channels, institutions, hotels and the like. What is being done, and what remains to be done so that provisions are reliable and uninterrupted? Albert Aleksandrovich Laks, deputy chief of the central industrial administration for capital construction, "Estonglavenergo," replies:

"All problems related to supplying the regatta with electrical energy can be broken down conditionally into three categories. To the first category we attribute those problems which concern the immediate electrical supply to the Pirita complex; to the second, projects in the central section of Tallin; to the third, everything outside of the city center and outside of the city limits. We will now take a look at what has been done.

In regard to the first division, a 110 kV transmission line has been constructed and put into operation and also a 110/10 kV substation at Saaremaa-Id which steps down the high-tension current to the required level and supplies the central distributing substation in Pirita, from which the energy goes to the users. Both the LEP (electrical transmission line) and both substations operate accurately on a continual basis and supply uninterrupted electrical energy to the sport sailing center. Participants at the recent ninth summer Spartakiada games for the peoples of the USSR and at the Baltic Regatta -- 79 had the opportunity to verify that the system worked. However, in order to eliminate once and for all any possibility of interruptions due to accidental damage, a reserve 35/10 kV electrical-supply system was built from the Viysmi substation.

In order not to violate the scenic landscape, underground electrical transmission cables were laid to and from the central distributing station and out to the consumers. An LEP for the electrical supply of the new telecenter has also been set up. "Estonglavenergo" is conducting all the works with the aid of the "Estelektroset'stroy" trust, which has enlisted the services of the Northern High-Voltage Network, the Tallin Electronetwork, the Tallin Heat and Power Plant and also the departments and services of the central board.

In connection with last year's decision by the organizations of the republics on the apportionment of people by city enterprises and organizations for participation in the construction of Olympic projects, "Estonglavenergo" took upon itself a part of the work in laying the internal electrocommunications in the buildings of the Pirita complex. A few days ago, the construction of a LEP for the electrical supply to People's Friendship Park was completed.

Let us leave Pirita, however, and move to the central section of the city. I invite you to take a unique tour -- not only in space, but in time. Many people have probably already noticed that construction work has begun in the yard of the domestic services building. Here a 110/10 kV Rann substation will be erected. A unique cable will run from Lasnamyae to the substation. The fact of the matter is that it will be the first 110 kV cable in the republic to be laid within city limits. Up until now, the maximum tension in similar LEP's did not exceed 35 kV. Of course, it would have been possible to run an aerial line, such as the one from the electric station to Lasnamyae, but it would have violated the appearance of the city. Thus, it was decided to conceal it in the ground. However, leading in the cable will completely solve the problem of supplying electricity to the central section of Tallin, not only for the period of the Olympic regatta, but also for several decades into the future.

But this is easy to say. Few people know the kind of difficulties we encounter when laying the trenches. Take, for example, Aedvil'ya Street. You will not find it on every city schematic, but on this one small by-street we discovered 17 old communication lines. Many of them had not even been shown in the schematics.

In the Uus-Sadama region, we ran across a unique relic indeed -- a wooden sewer pipe, made in the manner of a barrel -- out of boards, bound with hoops. And, you know, they were functioning up to the present. We have to somehow get around all these communication lines and not damage them. In degree of difficulty, one could compare this work with what we did when we set up the work front for the builders of the Olympia Hotel and the City Hall along the seaport. True, at that time we had to deal primarily with our own "household" -- electric cables -- but even so, we had to be careful with them, not causing any damage while transferring them

to another place and, moreover, not interrupting the transmission of electrical energy to the Tallin enterprises.

I would like here to use this opportunity to file a couple of complaints against the city organizations which carried out the earthwork, especially against the gas men and construction workers. Oftentimes, as soon as we leave after putting a cable in someplace, we have to hurry back because the diggers from the above named organizations have severed our cable while carelessly carrying out their own job. This, by the way, is what happened recently right by the Pirita complex.

It remains to discuss the third division of our conditional scheme -- the works outside of the Tallin city center and beyond the city limits. Relating to these works are, first of all, the capital reconstruction of the electrical power supply to the Lenin Komsomol Stadium. The necessity of rebuilding the existing electrical transmission lines along the roads leading up to Tallin also causes problems. This, in a most general outline is everything that concerns the supply of electrical energy to the Olympic regatta."

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BRIEFS

NEW POWER TRANSMISSION LINE--The builders of Primorye rural electric power transmission lines have put into operation a high-tension electric power transmission line between Nadezhdinskoye, (Solovey Klyuch) and (Krolevtsy). The powerline will supply energy from the state network to poultry meat and pork producing factories, which are under construction near Artem. More than 300 kilometer of high-tension electric power transmission lines have been put into operation since the beginning of the year. Currently more than 90 percent of all sovkhozes and kolkhozes in the kray are connected to the state power generating system. [Vladivostok Domestic Service in Russian 1100 GMT 2 Nov 79]

CSO: 1822

NEW GOALS FOR COAL PRODUCTION IN TENTH FIVE-YEAR PLAN

Moscow STROITEL'NAYA GAZETA in Russian 26 Aug 79 p 1

[Article by Deputy Coal Minister E. V. Polak, USSR Coal Ministry: "Fuel Arsenal of the Country"]

[Text] Our country occupies the first position in the world in coal production. In the Tenth Five-Year Plan it is proposed that new goals be achieved. How are mine builders coping with their increasing tasks? The editors asked E. V. Polak, Deputy Minister of the USSR Coal Industry Ministry, to tell about this.

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During the five-year plan the builders of mines in this ministry must deal with capital investments of more than 14 million rubles. This will make it possible to put into operation new mines for coal production for almost 100 million tons. Such an important problem is being solved by the construction of new enterprises, the reconstruction and modernization of currently used equipment and the introduction of progressive technology.

The program for the current year will exceed three billion rubles. The mine builders must put into operation mines for the production of 30 million tons of coal and facilities for enriching 19 million tons. In the complexes being put into operation there has been broad development of socialist competition for the timely starting-up of the enterprises and increasing the quality of the work. Many groups of workers are successfully contending with the adopted program.

For example, the organizations of the Ukrshakhtostroy Combine in February finished the first stage of the "Zapadnaya-Donbasskaya" mine, No 6-42. Now the subdivisions of the combine with a great work input are carrying out work on another mine installation, No 16-17. It is to be completed in the fourth quarter.

Good news is coming from Karaganda. After completing work on the mine imeni "50-letiya Oktyabr'," as a result of which its output increased by 900,000 tons, the mine builders are applying their efforts in order to ensure opening

of the "Tentekskaya-8" mine with a capacity of four million tons.

A group of workers of the Kuzbassshakhstroy Combine has completed the fourth stage of the Sibirginsk strip mine. The organizations of the USSR Ministries of Construction and Industrial Construction are coping with the task of putting facilities into operation. Among those put into operation is an enrichment plant for strip mines in Eastern Siberia for 4,100,000 tons and the third stage of the "Oktyabr'skiy" strip mine of the "Estonslanets" production combine for 1,200,000 tons.

It should be noted that some organizations are not coping with the plan for construction-assembly work for the first half-year and they must put out a great amount of effort in order to make up for lost time.

Rich coal deposits have been explored in the eastern regions of the country. In the Kansko-Achinskiy basin alone its reserves are reckoned at billions of tons. Favorable geological mining conditions here make it possible to carry out work by the most efficient strip mining method. The labor of the workers is being eased and the productivity and safety of work are being considerably increased. The cost of a ton of fuel is several times lower in comparison with underground production.

We are now producing more than a third of our coal by the strip mining method. In the immediate future this index will increase still further. The Coal Industry Ministry has proceeded to the implementation of a major program in the eastern coal regions. The Ministries of Transportation Construction and Power and other union ministries and departments are participating in this work.

Calculations show that with a well-conceived and coordinated work program for contruction organizations, suppliers and consumers, already in the next few years in these regions it will be possible to increase coal production by hundreds of millions of tons.

In order to exploit the new coal-producing regions more efficiently, within the ministry there has been organization of an all-union combine for the construction of fuel-energy complexes (SoyuzTEKStroy). Planning-technical documentation is being drawn up for the establishment of coal-producing enterprises, a construction base, new cities and worker settlements.

Hundreds of thousands of construction men are now working in the branch. They are preserving and broadening the Stakhanov traditions. At the vanguard of the competition are brigades which are fighting to achieve work volumes of a million and 500,000 rubles per year. There are about 300 such teams on the construction projects of the branch. Many of them are working under brigade contract.

Good words are being said of the brigadier Ivan Gavrinev of the Rostovshakhtostroy Combine. He and his comrades have achieved a high work productivity in the construction of a major complex at the mine imeni 60-letiya Leninskogo

Komsomol, for which the brigadier has been awarded the title of Hero of Socialist Labor. Work is being performed at a high rate by the brigades of Victor Yelizarov and Vil'gel'm Bekker at the Karagandashakhtostroy Combine. Each month great successes are being attained by the brigades of Vardan Zaseyev (Donetskshakhtostroy), Il'gizyar Mubarakhshin (Kuzbassshakhtostroy), Yuriy Khomenko (Mosbassshakhtostroy), Ivan Vertiporokh (Artemshakhtostroy) and many others.

The Party and government have a high evaluation of the work of these miners. Each year there in an improvement in their residential and cultural-living conditions. This year alone in the cities and worker settlements for workers of the branch there will be construction of more than two million square meters of living space, many schools, kindergartens and medical establishments.

More than 400 winners of the Lenin and State Prizes and the prizes of the Lenin Komsomol are working in the coal industry. About 600 workers have been awarded the high title of Hero of Socialist Labor. To follow the example of the best, to equal them in all respects -- this is the guarantee of successful implementation of the tasks placed before the workers by the Party and government.

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COMMENTARY ON USE OF COMPUTER IN GAS INDUSTRY

Moscow PRAVDA in Russian 17 Aug 79 p 2

[Article by V. Strizhov, Director of the "Nadymgazprom" Combine, and E. Kornin, Head of the Automatic Control System Section, "Nadymgazprom" Combine]

[Text] A person for the first time visiting the Medvezh'ye gas deposit cannot but marvel at the high level of mechanization and automation of gas production. For the first time in the country installations of a high unit capacity were constructed here. Each hole gives more than a million cubic meters of gas per day. This year the workers of the "Nadymgazprom" at Medvezh'ye will produce 65 billion cubic meters of "blue gold."

The Medvezh'ye deposit is a thousand kilometers away from the main consumers. But the workers do not have the right for even a minute to interrupt the delivery of gas through these superlong lines. That is why the problems involved in ensuring the reliability of operation of all our wells must be given special importance. This is not easily achieved. Indeed, it is necessary to "force" each gas well, each installation, not only every day but every hour to yield a very definite quantity of gas.

Electronics helps in making the most difficult computations, to determine the operating regimes of the wells. An automated control sysyem "ASU-Medvezh'ye" is operating at the "Nadymgazprom" Combine. The electronic computer has taken on itself many complex operations and in particular the collection of information on the activity of the enterprise. Each day in the morning we have an operations summary which gives a detailed and precise picture of the operation of all wells during the preceding 24 hours; it gives information on the number of operating and idle wells and on the technological parameters of the pipelines. Such precise information will make possible a timely adoption of a well-founded decision.

Earlier we also had to have operating summaries. But many people were involved in their preparation. They received their information by telephone. Sometimes the information was delayed and therefore lost its value. The electronic computer made it possible to organize an excellent, continuous and

absolutely objective information service. The computer took over monitoring of the geological parameters for working of the deposits. The computer predicts the movement of water into the productive stratum and makes it possible to take the necessary measures in time. Here is a characteristic example. During the initial period of exploitation of the deposit in one of the installations the gas began to issue from the wells together with water. Using the electronic computer it was possible to clarify the reason and rapidly take measures.

The automatic control system also helps in the solution of many other problems. In March of this year, for example, in connection with construction work on the main gas pipeline, it was necessary for a time to shut down the Urengoyskoye deposit. The Medvezh'ye deposit had to compensate for the cessation of gas deliveries from this "storehouse." For this it was necessary to increase considerably the daily delivery of fuel. The electronic computer calculated the maximum possible yield for each well. Additional fuel was produced without sacrifice for the further exploitation of the deposit.

Using the automatic control system we are now inventorying the principal funds, determining the availability of special clothing, and predicting orders for it.

We really must mention the solution of such a problem as the calculation of extra wages. In the North this is associated with one specific peculiarity: here a worker receives a 10% wage bonus for each half-year of work. The workers in the pay and accounts office must watch this very carefully and make recalculations precisely on time. Errors in this matter are inadmissible. However, if it is taken into account that several thousand persons work in the combine it becomes understandable why this is difficult to do. At our enterprise these calculations of extra wages are now made using an electronic computer. The computer registers everything in its memory and it knows precisely for whom the recalculations must be made and when. The computer has saved the pay and accounts office from very time-consuming work.

Using the experience of working with electronic computers, we are striving to employ them in the solution of more complex problems. Now, for example, our specialists are thinking about how computers can be employed in preparing a program for the material-technical supply of the combine. We would like for computers to monitor the operation of equipment and at the proper time give warnings about the need for preventive maintenance and the replacement of some particular part. This will make possible a marked increase in the reliability of operation of all the gas installations and will make possible the better organization of a continuous delivery of fuel to users.

The electronic computers at the "Nadymgazprom" have become an indispensable part of the control of production. However, we feel that the effectiveness of computer use can be increased. Computers of the M-4030 type have been installed in our computation center. They are simple to operate and function reliably. The innovators of this computer made the provision that in case of necessity the user can broaden its capabilities by means of installation of additional modules. But it is exceedingly difficult to do this. During the

last three years "Soyuzsistemkomplekt" has supplied the Gas Industry Ministry only two operational memory modules for the electronic computer. A second electronic computer installed at Nadym, due to the absence of such modules is loaded, for example, only 20%.

With the prevailing situation it is simpler to acquire a new electronic computer at a cost of about a half-million rubles than an additional memory module which would be seven times less costly. Such a situation does not exist only at our combine, but also in other organizations that are using electronic computers. Meanwhile, specialists know that merely by an insignificant additional unit the effectiveness of an electronic computer can be increased by several times.

To a still greater degree the effectiveness of the computer is dependent on the availability of a constantly improving mathematical support, including operational systems, applied programs, etc. The need for a constant revision of the mathematical support and its great cost are forcing foreign firms to adopt the approach of centralized servicing of users. Some of them, which sell electronic computers, are leasing mathematical support for them, guaranteeing the purchasers its constant improvement and revision.

We believe that in our country the time has come for creating an organization which would determine the feasibility of production of some item from a series of an aggregated system of computers and be concerned with the development of mathematical support for electronic computers. This would simplify the problem of centralized servicing of users. Upon acquiring an electronic computer the enterprise would be sure that all mathematical support innovations would be available to it. Moreover, in case of necessity a highly trained specialist could be sent to the user and would set up the latest version of an operational system for the electronic computer and would hand over technical documentation. Such procedures would sharply raise the effectiveness of use of electronic computers. There must also be an improvement in the supply of electronic computers with spare parts.

Every day greater and greater problems in the national economy are being solved with use of electronic computers. The number of computers is increasing. That is why the efficiency of their use is of particular importance. We think that the time has come to solve all these problems involved in the use of electronic computers. The state will receive a substantial economic gain from this.

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BRIEFS

PETROLEUM-GAS ADMINISTRATION GIVEN AWARD -- Decree of the Presidium of the Supreme Soviet Azerbaydzhan SSR. On award of the Diploma of Honor of the Presidium Supreme Soviet Azerbaydzhan SSR to the "Ordzhonikidzeneft'" Petroleum and Gas-Producing Administration of the "Azneft'" Combine. The Diploma of Honor of the Presidium Supreme Soviet Azerbaydzhan SSR is awarded to the "Ordzhonikidze" Petroleum and Gas Administration of the "Azneft'" Combine for its great contribution to the development and technical progress of the petroleum industry of the republic and in connection with the 75th anniversary of the beginning of exploitation of the Surakhanskoye petroleum deposit. (Signed) K. Khalilov, Chairman of the Presidium Supreme Soviet Azerbaydzhan SSR and G. Abilova, Secretary of the Presidium Supreme Soviet Azerbaydzhan SSR, Baku, 5 September 1979.
[Text] [Baku VYSHKA in Russian 6 Sep 79 p 1]

LIVING CONDITIONS IN TYUMENSKAYA OBLAST -- A field session of the board of the USSR Gosgrazhdanstroy and the Gosstroy RSFSR was held for discussion of measures for improving built-up areas, increasing the quality of housing and civil construction and strengthening the base of industrial residential construction in the cities of Tyumenskaya Oblast. The session was chaired by G. N. Fomin, Chairman of the USSR Gosgrazhdanstroy. Participating in its work were: S. N. Sabaneyev, Chairman of the Gosstroy RSFSR, V. I. Fedorov, a section head in the Central Committee CPSU Construction Division, A. G. Gudz', Deputy Minister of the USSR Gas Industry, V. G. Chirskov, Deputy Minister of the USSR Ministry of Construction of Enterprises in the Petroleum and Gas Industry, Ye. N. Altunin, Secretary of the Tyumenskiy Obkom CPSU, and the directors of a number of soviet and economic organizations in the oblast. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 29 Aug 79 p 3]

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